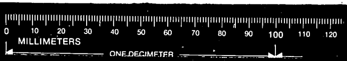
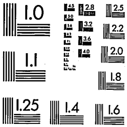


MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



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Thomas A Edison Papers

A SELECTIVE MICROFILM EDITION

PART III
(1887–1898)

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START

98

A Note on the Sources

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NOTEBOOK SERIES

Several sets of technical notes and drawings comprise the Notebook Series for 1887-1898. They appear on the microfilm in the following order:

(1) Notebooks by Edison
(2) Notebooks by Experimenters Other Than Edison
(3) Arthur E. Kennelly Notebooks
(4) Pocket Notebooks
(5) Miscellaneous Notebooks
(6) Unbound Notes and Drawings
    Dated
    Undated
    Oversize

Notebooks by Edison. These standard-size (6" x 9") books contain notes, drawings, and calculations regarding phonographs, lamp filaments, electric power, the kinetoscope, batteries, ore milling, the electric railway, and other subjects. There are also drafts of patent caveats, items relating to Edison's plans for the laboratory, and theoretical notes primarily concerning physics and electricity. Although the vast majority of the entries in these books are by Edison, there are also a few by associates such as Arthur E. Kennelly and William K. L. Dickson.

Notebooks by Experimenters Other Than Edison. These standard-size (6" x 9") books were used primarily at the West Orange laboratory, although some contain work performed at other locations such as the Edison Lamp Works in Harrison, N.J.; the New Jersey and Pennsylvania Concentrating Works in Ogden, N.J.; and the Edison Machine Works in Schenectady, N.Y. The books contain notes, drawings, tables, and calculations regarding a variety of subjects, similar to those in the Edison notebooks. In addition, there are records of chemical experiments and tests of electrical instruments. Among the individuals whose work appears in these books are Jonas W. Aylsworth, Charles Batchelor, William K. L. Dickson, Reginald Fessenden, James W. Gladstone, H. De Coursey Hamilton, Joseph W. Harris, John Ott, Arthur C. Payne, Franz Schulze-Berge, and Erwin Von Wilmowsky. There are also numerous notebooks generated by Arthur E. Kennelly and his assistants in the Galvanometer Room. A few books contain scattered entries by Edison. Two books in this group are not standard size but have archival "N-numbers" similar to those on the main run of notebooks.

Not all the standard-size notebooks used by Edison and his assistants appear in the Notebook Series. For example, several additional technical notebooks, used at the Ogden works, can be found in the New Jersey and Pennsylvania Concentrating Works Series. Non-technical notebooks (most of which have not been filmed) can be found in the Laboratory Records Series; the Alexander Elliott, Jr., Papers; and the New Jersey and Pennsylvania Concentrating Works Series.

Arthur E. Kennelly Notebooks. These eight notebooks contain transcriptions of material from the rough record books used by the experimenters in the Galvanometer Room. Included are notes, drawings, tables, and calculations regarding a variety of electrical experiments.

Pocket Notebooks. These books generally measure 3" or 4" in one direction and 6" or 7" in the other. They contain notes, drawings, and calculations by Edison and other experimenters relating to phonographs and phonograph cylinders, electric lighting, meters, batteries, ore milling, x-ray tubes and apparatus, metals and alloys, chemical experiments, and other subjects.

Miscellaneous Notebooks. These fourteen books contain notes and drawings relating to phonographs, electric lighting and power, ore milling, and x-rays. Among the individuals whose work appears in these books are Edison, Mina Miller Edison, William K. L. Dickson, Clarence B. Fargo, and H. M. Phillips.

Unbound Notes and Drawings. These loose items relate to a variety of subjects, including the phonograph, electric lighting and power, ore milling, batteries, the kinetoscope, telegraphy, and telephony. Many of the items are by Edison. There is also material by Charles Batchelor, Arthur E. Kennelly, John Ott, and other associates. In addition, there are notes by various laboratory experimenters, including Jonas W. Aylsworth, John Joseph Force, H. De Coursey Hamilton, and Joseph W. Harris.

All of the entries in Edison's hand appearing in the bound notebooks have been filmed. Unbound material in Edison's hand has also been filmed except for a few rough notes where the lack of context makes the entries undecipherable.

A more selective approach has been taken for notes and drawings by experimenters other than Edison. Notebooks and unbound material relating to experimental work done at the West Orange laboratory have generally been filmed with the exception of the extensive run of rough record books used by Arthur E. Kennelly and his assistants in the Galvanometer Room. Transcriptions of most of these rough records can be found in the Kennelly notebooks.

Notebooks and unbound material pertaining to routine technical work performed at the laboratory have generally not been filmed. In many cases, the items not filmed represent the work performed by the laboratory in its role as an auxiliary service arm for Edison's manufacturing companies. Examples include the assays done on behalf of Edison's ore milling companies and the qualitative analyses of the stearic acid used by the Edison Phonograph Works in the manufacturing of cylinders.

Some notebooks contain a mixture of experimental material and routine technical entries. These notebooks have been filmed in their entirety except in cases where the experimental material can be easily distinguished from the routine entries.

Numbering Systems for Edison's Notebooks

Over the years, a variety of numbering systems have been employed by Edison and others to identify the notebooks used in the West Orange laboratory. Many of the standard-size (6" x 9") books have a small numbered label on their spines. These labels were probably affixed to the books in 1903. Books 2-35 were generated during the period 1880-1886. These books were filmed in the *Thomas A. Edison Papers Microfilm Edition, Part II*. Book 1 and books 36-143 were generated during the period 1887-1895. About 75 technical notebooks dating from the period 1887-1895 lack spine numbers, including most of the books used exclusively by Edison.

In addition, there are about 75 notebooks, most of them used by experimenters other than Edison during the period 1887-1892, that contain a number affixed to their front covers. These numbers range from 494 to 641 and do not seem related to the numbers on the front covers of the notebooks used prior to the opening of the West Orange laboratory. Unlike the spine numbers, these numbers were probably affixed to the books before they were put into use.

Beginning in the late 1930s, the archivists at the West Orange laboratory began assigning "N-numbers" to the standard-size notebooks. This six-digit number generally corresponds to the first dated entry. For example, a book whose first dated entry is from May 9, 1887 carries the number, N-87-05-09. Books with the same N-number are distinguished by an extension number; for example, N-87-12-08.1 and N-87-12-08.2.

The N-number is not always reliable as an indicator of the date that a book was put into use. Some books were used for a long period of time before an entry was dated. Others contain no dated entry. In such cases, a conjectured year serves as the first two digits of the N-number. For example, a book that probably dates from 1887 would carry the number, N-87-00-00. Subsequent research has revealed that some of these conjectured years are inaccurate. A few undated books are so problematic, that no effort has been made to assign a year. Such books are indicated by the notation, "N-Undated," plus an extension number.

The N-number system is the only one that was consistently applied to all the standard-sized books. For that reason, the notebooks are organized on the microfilm in N-number order. Pocket notebooks, which contain similar six-digit numbers preceded by the designation, "PN," appear in PN-number order. Since form, rather than content, determined which bound volumes would be assigned N and PN numbers, not all the books so designated are experimental, or even technical, in character. Items with these numbers can also be found in the Laboratory Records Series; the Alexander Elliott, Jr., Papers; and the New Jersey and Pennsylvania Concentrating Works Series.

The following is a list of standard-size notebooks for 1887-1894, along with the various numbers assigned to them. Information in brackets has been supplied by the editors from data found in a list of notebooks prepared ca. 1903 and in a card catalog generated during the 1930s or 1940s.

Spine Number	**Cover Number**	**N-Number**
1		87-00-00.4
3[6]		87-05-09
37		87-05-13
38		87-06-01
[39]		[?]
40		87-11-21
41		87-12-08.1
42		87-12-10
43		88-02-07
	494	88-05-08
44	497	87-12-00
	499	87-06-00
45		87-12-26
46		88-01-00
47		88-01-03.2
48	512	88-06-06
49		88-01-10
50		87-12-22
51		88-02-01.1
[5]2		88-02-01.2

Spine Number	Cover Number	N-Number
53	509	88-06-10
[54]		[*]
[5]5		88-02-14
56		88-02-17
57		88-03-15.1
58		88-03-20
59		88-03-23
60		88-03-27
61		88-03-29
62		88-03-30
63		88-04-18
64		89-12-31
65	501	88-05-17
66		88-05-22
67		88-05-24
68		88-01-03.1
[69]	503	88-05-31

*Missing book: "Battery Tests P. & Electric Light," February-May 1888.

Spine Number	Cover Number	N-Number
70	514	88-06-26
71	507	88-07-03
	504	88-05-01
72		[*]
	511	88-06-28
[73]	510	88-07-26
[74]		88-08-12
75	517	88-08-28
76	518	88-09-03.2
	520	88-03-06
77	521	88-09-21
78	525	88-09-28
79	519	88-09-03.1
	524	88-10-02
	533	88-11-13.3
80	534	88-11-13.1
81	535	88-11-13.2

*Missing book: Arthur E. Kennelly, "Physical Measurements," July-August 1888.

Spine Number	Cover Number	N-Number
[82]	536	88-11-13.4
	537	88-11-13.5
83	540	88-11-19.3
84		88-01-19
85	500	88-05-12
[86]		[*]
87	538	88-11-19.1
88	539	88-11-19.2
89		89-06-21.1
	542	89-01-10
	[549]	89-05-18
[90]		[?]
[91]		[?]
92	551	89-05-30.1
	553	89-06-19
93	555	89-06-21.2
94	563	89-07-08

*Missing book: A. Kaper, "Battery Converters," March-July 1890.

Spine Number	**Cover Number**	**N-Number**
95		89-08-15
	564	87-01-01
	565	88-08-23
	567	89-04-30
96	568	89-09-24
97		88-11-28
98	570	89-10-21
	572	89-10-15
99	573	89-10-29
100		89-11-08
101	575	89-12-02
102	576	89-12-11
	577	89-12-13
	579	90-01-01.1
	580	90-01-04.7
	581	90-01-04.3
	582	90-01-04.4
	583	90-01-04.5
	584	90-01-04.6

Spine Number	**Cover Number**	**N-Number**
	585	90-01-04.2
[103]		[?]
104	586	90-01-04.1
105	588	90-01-08
106	589	90-01-13
107	593	90-02-06
108	594	90-02-06.1
109	596	90-02-10
	602	90-03-14.1
110	606	90-09-02
111	6192 [619.2?]	90-09-11
	604	90-03-14
112	605	90-07-22
[113]		[?]
114	608	90-09-24
115	607*	90-11-07.1
	608**	90-11-07.2

* Inscription on label: "6007."
** Inscription on label: "6008."

Spine Number	**Cover Number**	**N-Number**
116		90-11-29
117	609	90-10-17
118	2167[?]	91-02-09
119	620	91-04-30
120	621	91-06-17
121	629	91-07-27
122		91-09-03
123	639	91-09-22
124		91-10-14
125	639	91-10-23
	639	93-01-01
127		91-12-05
128		92-00-00.1
129		91-12-30
130		92-03-19
131	640	92-03-30.1
	641	92-05-02
132		92-04-22
133		92-06-02

Spine Number	**Cover Number**	**N-Number**
134		92-09-28
135		92-03-30
136		93-01-03
137		93-02-10
138		93-03-31
139		93-05-16
140	508	88-06-30
[141]		[?]
[142]		[?]
143		95-09-12

NOTEBOOKS BY EDISON

These notebooks cover the period 1887-1898. There are also scattered entries from the early 1900s. Most of the books were used at the West Orange laboratory. Almost all entries are by Edison, although there a few by associates such as Arthur E. Kennelly and William K. L. Dickson. The books contain notes, drawings, and calculations regarding a variety of subjects, including phonographs, lamp filaments, electric power, the kinetoscope, batteries, ore milling, and the electric railway. There are also drafts of patent caveats, items relating to Edison's plans for the laboratory, and theoretical notes primarily concerning physics and electricity.

NOTEBOOKS BY EDISON

Notebook, N-87-00-00.1

This undated notebook was used by Edison, probably in 1887, for drawings and calculations relating to electrical experiments. There are also inscriptions by Edison on page 3: "Theory" and "Magnetism tends to."

Notebook, N-87-00-00.2

This undated notebook was used by Edison, probably in 1887 or 1888. The book contains drawings and occasional calculations relating to ore milling and electric lighting. In addition, there is a list of items for a phonograph caveat and another list, apparently of items to be made for the laboratory. Included on that list are phonogram cylinders, insulation, carbon buttons and chalk cylinders, meter solutions, kinetoscope materials, and condensers.

Notebook, N-87-00-00.3

This undated notebook was probably begun in 1887, but it may have been used as early as 1886. All entries are by Edison. Included is a proposed plan for the West Orange laboratory and a list of schemes to be worked there. There are also several notes and drawings about telephone experiments, a few generator drawings, and notes on miscellaneous electrical and chemical experiments. At the beginning of the book is an itinerary for a trip by Edison to Philadelphia, Baltimore, and Washington. The last several pages contain addresses of individuals and firms in Continental Europe.

Notebook, N-87-00-00.4

This undated notebook was used by Edison, probably in 1887 and 1888. It contains drawings and a few notes regarding phonograph designs, including one drawing labeled "phonograph movements for 1878 model."

Notebook, N-87-01-27

This notebook was begun by Edison, probably in January 1887, but it may have been used as early as December 1886. It was possibly used at the lamp factory for notes on squirted filament experiments, nos. 39-142.

Notebook, N-87-03-00

This undated notebook is a continuation of N-87-01-27. It was used by Edison for notes on squirted filament experiments, nos. 143-166. Also included are several lists of chemicals, which precede and are possibly related to the filament experiments.

Notebook, N-87-03-01

This notebook covers the periods March 1887 and March 1901. All entries are by Edison. The first entry is undated and relates to battery experiments. It is followed by a set of notes and a drawing from 1887 pertaining to the development of an economical prime motor (probably his magnocaloric motor). In the course of making these notes, Edison recorded a discovery regarding magnetized iron. Following these entries are additional notes about battery experiments. The next dated entry is from March 1901 and concerns Edison's theoretical speculations on electricity and magnetism. There are also a series of hypotheses and some notes about thermoelectricity. The remainder of the book consists of miscellaneous notes, drawings, and calculations about thermoelectricity and batteries and some drawings that appear to be plans for an ore milling plant.

Notebook, N-87-03-02

This notebook covers the period March 1887. All entries are by Edison. The book contains notes and drawings about his magnocaloric motor, which John Ott was making.

Notebook, N-87-04-00

This undated notebook is a continuation of N-87-03-00. It was used by Edison for notes on squirted filament experiments, nos. 167-207. There is also a 3-page list of fluorescent materials.

Notebook, N-87-09-02

This notebook covers the period September 1887-October 1889. All entries are by Edison. The book contains drawings and occasional calculations relating to the electric railway, dynamos, and 3- and 4-wire electrical distribution systems. In addition, there are drawings and patent caveats for the phonograph, typewriter, and spiral kinetoscope. There is also a list of cost calculations for an ore milling system.

Notebook, N-87-11-15

This notebook covers the period November 1887-September 1888. All entries are by Edison. At the beginning of the book is a 10-page draft letter outlining plans for the new West Orange laboratory to James Hood Wright, a partner in the investment banking firm of Drexel, Morgan & Co. and a director of the Edison Electric Light Co. Most of the book contains notes and drawings relating to projects planned for the new laboratory. Included are entries concerning photography, lamp filament, and phonograph cylinder experiments; improvements in the telephone transmitter; and the production of diamonds by chemical means. There are also hypotheses regarding electrical and chemical properties to be tested. Next to each entry is the name of the associate or assistant to whom Edison intended to assign the project, including John Ott, Charles Batchelor, William K. L. Dickson, Arthur E. Kennelly, Martin Force, Franz Schulze-Berge, H. De Coursey Hamilton, John English, and D. T. Marshall. At the end of the book are notes, drawings, and calculations pertaining to hydroelectric power production at Niagara Falls.

Notebook, N-87-11-21

This notebook covers the period November-December 1887. All entries are by Edison. The book contains notes and drawings regarding a repeating device for the phonograph. The spine is labeled "40."

Notebook, N-87-12-08.2

This notebook covers the period December 1887-May 1888. Most of the book consists of tests made on Lalande batteries by an unidentified experimenter. At the beginning of the book are 10 pages of notes by Edison, dated December 8-10, containing instructions for chemical experiments on lamp filaments, phonograph cylinders, magnetic iron ores, and other materials. Following Edison's notes are 3 pages by Arthur E. Kennelly, possibly listing laboratory projects involving technologies such as the telephone and the pyromagnetic generator.

Notebook, N-87-12-10.1

This notebook covers the period December 1887-November 1889. All entries are by Edison. The book contains drawings and several long notes relating to filament experiments. There are also phonograph drawings; notes on battery solutions; and notes, drawings, and cost calculations regarding ore milling and hydroelectric power production at Niagara Falls. On the inside back cover is a list of points to include in an electric railway caveat.

Notebook, N-87-12-10.2

This notebook covers the period December 1887-November 1888. All entries are by Edison. Included are several notes to John Ott, written about December 12, 1887, in regard to proposed experiments on a pyromagnetic generator, arc lights, telephones, batteries, carbonization, and the use of a thermostatic meter strip as a meter, as well as experiments to "ascertain if there is any substance which stands the lines of magnetic force." There are also some drawings of the phonograph dating from September and November 1888. The remaining entries are undated and consist of notes on experiments to determine whether iron "is a non conductor of electric stress." Some of these notes also contain Edison's speculations about the electromagnetic properties of the ether.

Notebook, N-88-00-00

This undated notebook was used by Edison, probably in 1888 or 1889, for notes on compositions for cylinder records.

Notebook, N-88-00-00.1

This undated notebook was probably used in 1888. The entries are by Edison and his wife, Mina Miller Edison. The book contains notes regarding the melting properties of numerous chemical compounds used for insulation. Some of the compounds are identified for potential use in phonograph cylinders or lamp filaments.

Notebook, N-88-00-00.4

This undated notebook was used by Edison, probably in 1888, for notes on chemicals and calculations on lamp sales and profits. There are also a few phonograph drawings.

Notebook, N-88-01-03.1

This notebook was probably begun in 1887, but the first dated entry is for January 3, 1888. All entries are by Edison. The undated entries consist of notes on substances, taken from the third volume of Watt's *Chemical Dictionary*. The dated entries include drawings relating to phonograph recording surfaces, the pyromagnetic generator, and electromagnetism. Following these drawings are undated notes and drawings concerning electromagnetic devices (including condensers and a diamagnetometer), dynamo armatures, electric railways, filaments, wax compounds for recording cylinders, and a motograph telephone. Finally, there are notes and drawings from May 1888 relating to the design of an electric typewriter and to battery experiments.

Notebook, N-88-01-03.2

This notebook was probably begun by Edison on January 3, 1888. The first page contains the notation, "Idea Book." At the front of the book are a series of notes and drawings for a caveat covering phonographs, electric lighting, ore milling, and batteries (April 29, 1889); an electric brake caveat (June 15, 1889); and an electric railroad caveat (April 10, 1890). Near the end of the book is a 5-page list of proposed inventions, followed by notes on phonograph caveats (April 14, 1888; November 10, 1888) and electric lighting experiments (April 14, 1888).

Notebook, N-88-02-02

This notebook covers the period February 1888-April 1889. All entries are by Edison, except for one entry by Arthur E. Kennelly. Included are notes and drawings regarding a long-distance telephone transmitter using phonograph cylinder technology. There are also entries pertaining to battery experiments, disk phonographs, and a fluorescent light caveat; cost calculations relating to the buildings and employees required for an ore milling operation; and notes and drawings concerning electromagnetism.

Notebook, N-88-03-15.2

This notebook covers the period March 1888-March 1889. There is also one entry for October 1889. All entries are by Edison. At the beginning of the book are notes regarding the production of aluminum by electrolysis. Most of the book contains drawings and draft patent caveats for the phonograph and for squirted lamp filaments. There are also calculations for an ore milling operation.

Notebook, N-88-06-01.1

This notebook contains dated entries from June 1888. All entries are by Edison. At the beginning of the book is a 49-page list of minerals wanted for a specimen cabinet. On the following pages are notes and drawings relating to phonograph experiments, resins for recording cylinders, batteries (including those for the phonograph), and ore milling. Some of the notes on the phonograph contain references to Edison's recent patent applications. At the end of the book are several pages of miscellaneous drawings.

Notebook, N-88-06-01.2

This notebook contains dated entries from 1888 and 1889. All entries are by Edison. At the beginning of the book is a 20-page list of items wanted for the laboratory. The following pages contain undated drawings relating primarily to phonographs and dynamos. Also included are a page labeled "Caveat Dec 7 [1888]," pertaining to an unidentified technology; a partial floor plan, possibly for the phonograph works; some notes on chemical experiments; and notes and drawings for a municipal lighting system, labeled "Caveat May 23 89." Near the end of the book is a memo regarding the acquisition of some catalogs.

Notebook, N-88-06-26

This notebook was used by Edison in June 1888 for notes, drawings, and calculations regarding a motor for the phonograph.

Notebook, N-88-09-13

This notebook contains dated entries primarily from November 1888; there is also one entry from September 13, 1888. All entries are by Edison and relate principally to the cylinder phonograph. At the beginning of the book are illustrated instructions to Arthur E. Kennelly regarding alternating current experiments and a set of notes concerning filament experiments.

Notebook, N-88-10-01

This notebook covers the period October 1888-January 1889. It was used by Edison for drawings relating to dynamos, electric power distribution, and lamp vacuum experiments. Also included are notes and drawings pertaining to phonograph, typewriter, and ore milling caveats. At the end of the book is a table of chemicals and suppliers and a series of calculations. Inserted into the book is a 2-page note from Edison to experimenter James W. Gladstone regarding phonograph cylinders.

Notebook, N-88-11-02

This notebook contains dated entries from November 1888. All entries are by Edison. At the beginning of the book are undated notes and drawings relating to phonograph designs, cylinder compounds and designs, and insulation compounds. There are also notes and calculations regarding electric lighting and a memorandum about a combination with Thomson-Houston. At the end of the book are notes on chemical experiments, a drawing of a dynamo armature, and notes and drawings pertaining to phonograph designs.

Notebook, N-89-00-00.1

This undated notebook was used by Edison, possibly in 1889. It contains drawings of lamps and filaments, calculations of costs for ore milling, drawings of ore separators, and lists of compounds derived from a multivolume work on chemistry. There are also various other drawings and calculations.

Notebook, N-89-05-18

This notebook covers the period May 1889-November 1893. The first set of entries are by Edison and consists of notes and drawings regarding ore milling, including a "wet separation" process. The following entries are by Edison associate William K. L. Dickson and include notes, drawings, and calculations regarding separation and analysis of Cornwall ore. Inserted into the book are 10 numbered pages containing notes, drawings, and calculations by Dickson, entitled "Final Result of Expts on Bar Magnets - Ogden."

Notebook, N-90-01-04.2

This notebook was begun during January 1890. Most of the entries are by Edison. There are also some entries by an unidentified assistant. The book contains lists of mines, mainly in North Carolina, but also in Georgia, the New England states, and the Great Lakes region. Among the ores noted are gold, copper, and iron. Also included are notes by Edison to surveyors Samuel G. Burn, Arthur C. Payne, and Charles J. Reed regarding mining regions in the northeastern United States.

Notebook, N-90-01-04.3

This notebook covers the period January-December 1890. All entries are by Edison. At the beginning of the book is a list of iron mines in New York, New Jersey, and Pennsylvania. The book also contains drawings of the phonograph and the electric railway; notes regarding the technical and commercial development of the electric light, including notes on the contractual arrangement between the laboratory and the manufacturing company (possibly the Edison General Electric Co.); lists and drawings for an ore milling operation; and an enumeration of salaries and other operating expenses at the West Orange laboratory. There are also hypotheses on conductivity and resistance and notes on filament experiments.

Notebook, N-90-01-04.4

This notebook covers the period January 1890-March 1891. All entries are by Edison. The book contains notes relating to numerous mines and methods of ore separation for iron, copper, gold, and nickel. Also included are drawings regarding phonographs, generators, and electrical distribution systems. Near the end of the book are cost calculations for the North American Phonograph Co.

Notebook, N-90-01-04.5

This notebook covers the period January 1890-April 1893. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling, including what appears to be a list for a patent caveat. There are also electric railway drawings and notes for a series of chemical experiments.

Notebook, N-90-01-04.6

This notebook was begun in January 1890. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling, including cost estimates based upon labor and energy requirements for separating iron, copper, and nickel ores from the Sudbury mining region. There are also notes regarding the testing of numerous chemical compounds for potential use in incandescent lamp filaments or phonograph cylinders. Edison's notations indicate that he assigned many of these chemical tests to an experimenter named "Joe," possibly John Joseph Force.

Notebook, N-90-01-04.7

This notebook covers the period January-May 1890. All entries are by Edison. The book contains extended theoretical notes about electricity and electromagnetism, including an entry in which Edison compares his own theories with those of James Clerk Maxwell. There are also notes and drawings relating to unidentified electrical equipment, ore milling and bricking machinery, electric traction, and electric lighting experiments for both incandescent and arc lamps. In addition, there is a list of chemical compounds to be tested.

Notebook, N-90-08-03

This notebook covers the period July-August 1890. All entries are by Edison. The book contains notes, drawings, and calculations relating to ore milling and electric traction. Also included are draft caveats regarding the belting and separation processes for ore milling, as well as a caveat for an alternating meter.

Notebook, N-90-11-07.1

This notebook covers the period November 1890-January 1892. All entries are by Edison. The book contains a list of chemical compounds, nos. 1-28. There are also notes regarding carbonization tests for compounds; these entries are possibly related to Edison's filament experiments.

Notebook, N-90-11-07.2

This notebook, which covers the period November 1890-September 1892, is a continuation of N-90-11-07.1. All entries are by Edison. At the beginning of the book are notes regarding some of the 289 compounds from the preceding book, tested as solvents for syrian asphalt. Also included are notes relating to carbonization tests and to squirted filament experiments, as well as drawings and calculations, probably pertaining to ore milling.

Notebook, N-91-09-03

This notebook covers the period September-October 1891. All entries are by Edison. The book contains notes and drawings regarding the "blue bulb" phenomenon and the reduction of mercury vapor in incandescent lamps. There are also notes on various filament experiments, including entries, numbered 1-19, relating to the deposition of carbon and other compounds on the filaments. Edison's notations indicate that he was often assisted by an experimenter named "Joe," possibly John Joseph Force.

Notebook, N-91-10-14

This notebook, which covers the period October 1891-October 1894, is a continuation of N-91-09-03. The book contains notes and drawings by Edison regarding filament deposit experiments, nos. 20-35. There are also notes concerning related experiments, including tests of basic pH solutions for treating filaments. At the end of the book are two loose pages of notes by an unidentified experimenter.

Notebook, N-92-02-22

This notebook was begun during February 1892. All entries are by Edison. The book contains notes and drawings relating to various electrical experiments. Included are entries regarding the conductivity of iron, magnetism, Foucault currents, telephone transmission, and the optical behavior of iron subjected to alternating current. There are also theoretical notes about the properties of aluminum, along with drawings, notes, and calculations pertaining to ore milling. Among the latter are several pages of cost analyses, probably based upon operations at the New Jersey and Pennsylvania Concentrating Works plant at Edison, N. J. in September 1892.

Notebook, N-92-03-30

This notebook covers the period March-May 1892. At the beginning of the book are entries by Edison and Arthur E. Kennelly regarding various electrical experiments and theoretical notes relating to dynamos, dielectrics, electric lighting, and magnetism. The remainder of the book contains notes, drawings, and calculations by Kennelly and by unidentified Galvanometer Room experimenters pertaining to differential dynamometers, transformers, batteries, and a 3-wire electrical distribution system. Transcriptions of these latter records can be found in Arthur E. Kennelly Notebook #6.

Notebook, N-92-04-16

The one dated entry in this notebook is from April 1892. All entries are by Edison. The book contains extended theoretical notes relating to gravity and other astronomical forces, the nature and structure of the solar system, and the transmission of light waves and electrical energy. Also included are notes, drawings, and calculations regarding electrical experiments.

Notebook, N-94-12-11

The one dated entry in this notebook is from December 1894. The first page bears the inscription: "Mr. J. Coote Edisons Laboratory Orange, N.J. Dec 11th 94." All remaining entries are by Edison and pertain to squirted filament experiments, with notations for boxes numbered 1-20 and brass boxes numbered 1-8. Near the end of the book is a page entitled "Index," which has no apparent relation to the preceding entries.

Notebook, N-95-01-24

This notebook contains dated entries from January 1895. All entries are by Edison. At the beginning of the book are notes and drawings regarding the phonograph, including notes and hypotheses relating to phonograph diaphragms and sound reproduction. There are also notes, drawings, and cost calculations pertaining to ore milling.

Notebook, N-95-12-04

This undated notebook was probably used in 1895. The book consists primarily of notes by Edison regarding a series of squirted filament experiments, nos. 1-62. Preceding these notes is a list of solutions used to treat the filaments. Inserted into the book are several loose sheets containing notes by Edison to experimenter Charles Dally concerning the testing of the filaments at the General Electric lamp works in Harrison, N.J.; and logs of the tests by Charles Deshler.

Notebook, N-96-00-00.1

This undated notebook was used by Edison, probably in 1896, for meter or battery experiments. The book contains notes and calculations regarding tests of various electrolytic solutions and notes on amalgamating zinc electrodes with mercury.

Notebook, N-96-03-10

The one dated entry in this notebook is from March 1896. At the beginning of the book is a list by Edison regarding various substances to be used in x-ray fluorescence experiments. There is also a longer list of compounds, nos. 130-1298, compiled by Edison and an unidentified experimenter, probably relating to x-ray experiments.

Notebook, N-96-03-12

This notebook is a continuation of N-96-03-10. The only dated entry is from March 1896. All entries are by Edison. The book contains lists of compounds tested for fluorescence, as well as notes, drawings, and calculations regarding the x-ray. There is also a draft in Edison's hand of an advertisement for the Edison Storage Battery Co., which was incorporated in May 1901.

Notebook, N-96-06-21

This notebook was used during June 1896. All entries are by Edison. The book contains notes and drawings relating to the telephone, hearing aids, fluorescent lamps, and the x-ray. Also included is a list of compounds tested for fluorescence.

Notebook, N-98-00-00.1

This undated notebook was probably used sometime between 1894 and 1898. At the beginning of the book are lists and notes by Mina Miller Edison regarding her schedule for a week's activities. Included are notes about arrangements, a guest list, and a draft invitation for a party. Among the guests listed are Llewellyn Park residents, such as Henry B. Auchincloss and various members of the Colgate family; Edison associates, such as Charles Batchelor; and several members of the Miller and Edison families, including Mina's siblings, Theodore and Grace, and Edison's sons, Thomas and William. The remainder of the book contains notes, drawings, and calculations by Edison, probably relating to ore milling, as well as a list noting the properties of numerous organic compounds.

Notebook, N-98-00-00.2

This undated notebook is a continuation of N-98-00-00.1. All entries are by Edison. The book contains a list noting the properties of numerous chemical compounds. Some of the compounds are indicated as being for possible use in squirted filaments, phonograph cylinders, or fluorescence experiments. Also included is a note regarding the bricking process for ore concentrating.

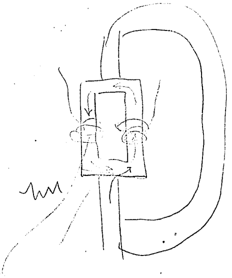
Notebook, N-Undated.32

This undated notebook was probably used during the 1890s, but it could have been used during the early 1900s. All entries are by Edison. The book contains notes and drawings probably relating to either ore milling or Portland cement plant operations. Included are several rough drawings of gearing and gear ratios.

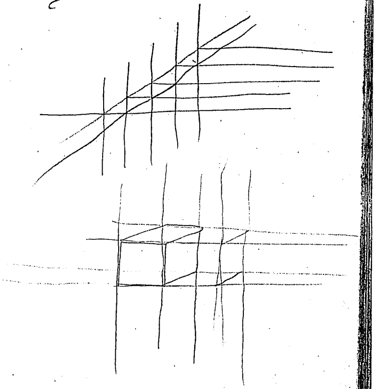
Notebook, N-87-00-00.1

This undated notebook was used by Edison, probably in 1887, for drawings and calculations relating to electrical experiments. There are also inscriptions by Edison on page 3: "Theory" and "Magnetism tends to." The book contains 288 numbered pages.

Blank pages not filmed: 12-288.



Theory:



Magnetism tends to

2000
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1800
50

2000
5000

2000 —	1	100
	2 —	25
	4	6
	8	1.5
	16	10000 ft lbs
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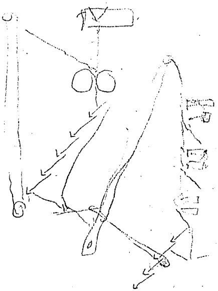
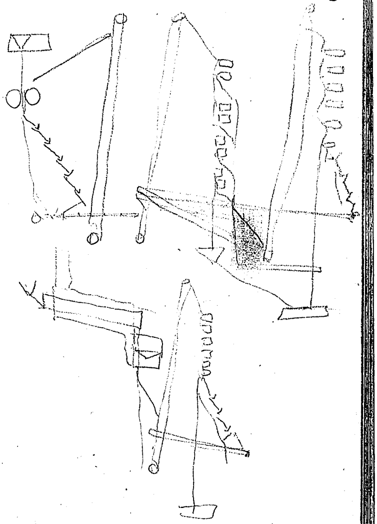
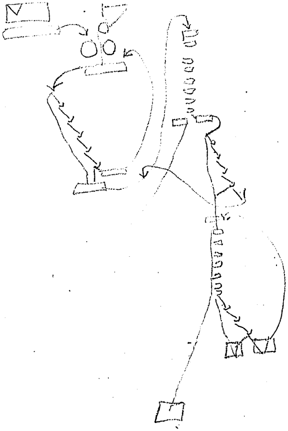
	128	150
	256	36
	512 —	9
	1000	2.2
	2000	1/2 ft lb







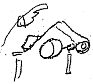
Notebook, N-87-00-00.2

This undated notebook was used by Edison, probably in 1887 or 1888. The book contains drawings and occasional calculations relating to ore milling and electric lighting. In addition, there is a list of items for a phonograph caveat and another list, apparently of items to be made for the laboratory. Included on that list are phonogram cylinders, insulation, carbon buttons and chalk cylinders, meter solutions, kinetoscope materials, and condensers. The pages are unnumbered, and the book has been used in both directions. Approximately 100 pages have been used.

XE172 [870000.2]

Points for phono Caveat:

split cylinders -
wax varnish
false cylinders
Waxed paper -
Revolving Recorder & Reciever
Extra Duplicating Transmitter,
Gramme motor -
arranged Electric light etc,
Hand turning machine -
" "
Clockwork with intervening mechanism to stop
Cog wheel vibration -
Hand turning with single straight edge.
Seperate turning off Knife running in seperate Knife edge & not lifted with the Recorder arm -
Double cylinder machine -
flat plate machine —
Solid tin for clocks & toys -
new Reciever -
Cloth shellaced for diaphragm -
see Chronograph Clockwork for phonogh



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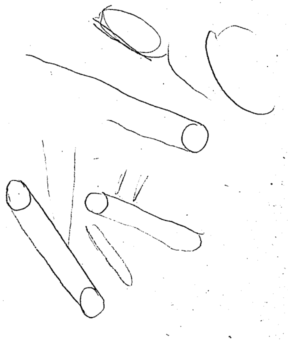
5	36	34 of	30
6	42	40 of	34
7	48	47 of	40
8	54	54 of	48
9	61	61 of	54
10	67	68 of	61
11	74 —	75 of	68
12 —			



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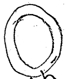

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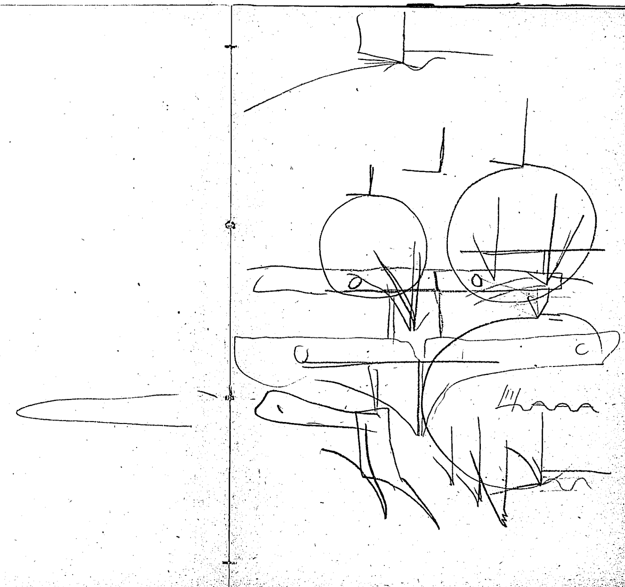
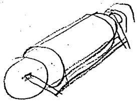
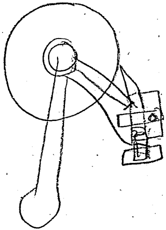


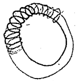




Mina Miller Edison

Mina Miller Edison

Edison



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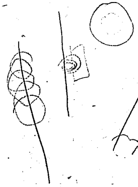
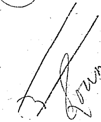


Miller

Edison



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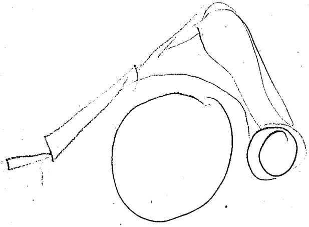

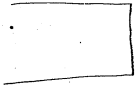

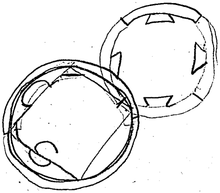

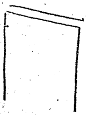

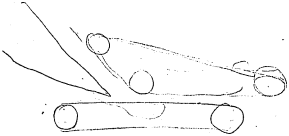

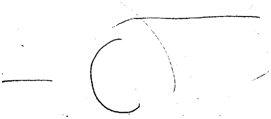

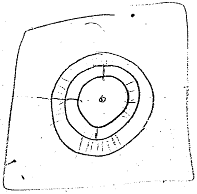

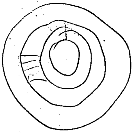

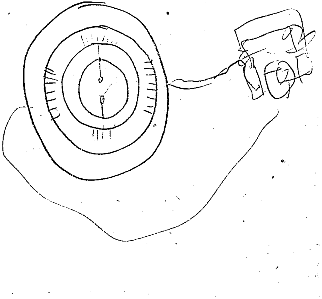

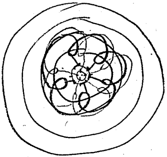

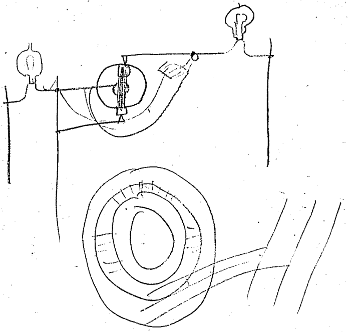

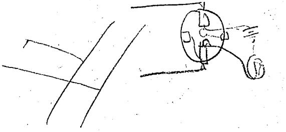

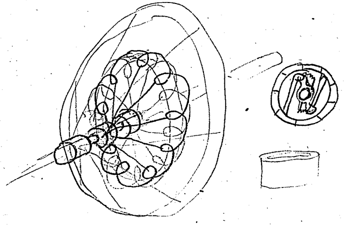

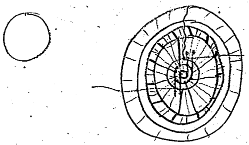

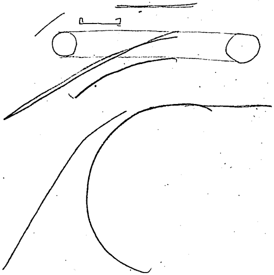

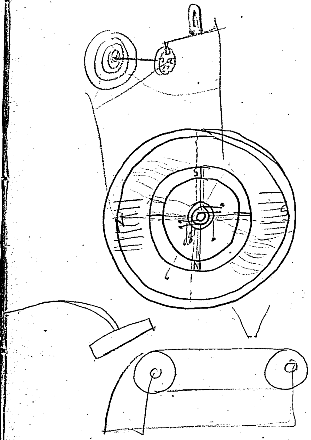
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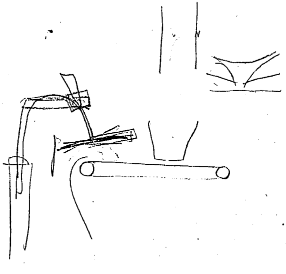

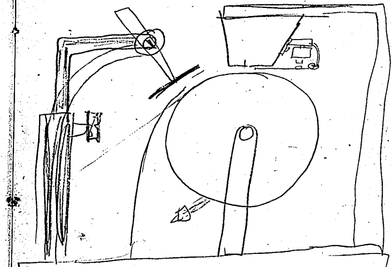

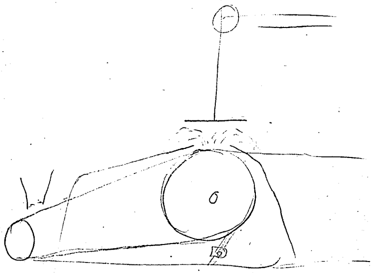

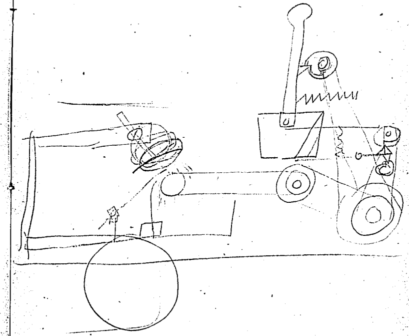

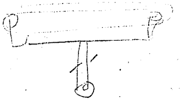

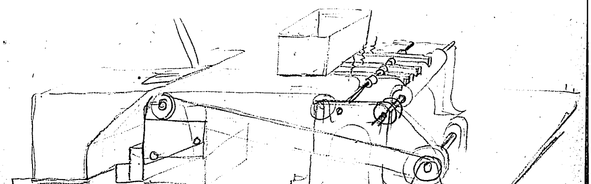

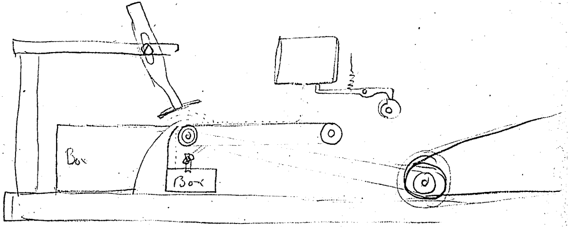
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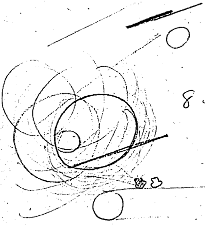
2 inch second

9 feet min -



4 feet min -

8 square feet min

24 inch belt

12 minutes.

inch deep 1 sqr foot.

60) 144 (2 hours 1/2 - Square foot.

150 lbs -

300 lbs 5 hour
6

3/4 ton day 24 hours

1 ton 3 inches

15 tons 1 foot high in min

60 tons 1 foot high 1 min

$\frac{1}{60}$ hp for hour

1/120

24
60
1440

Insulation Block white } for wire.

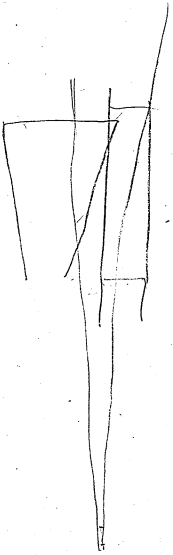
Cheap Ins for cable. for Subways ~~Non~~ fusible by ~~high~~ Specific heat

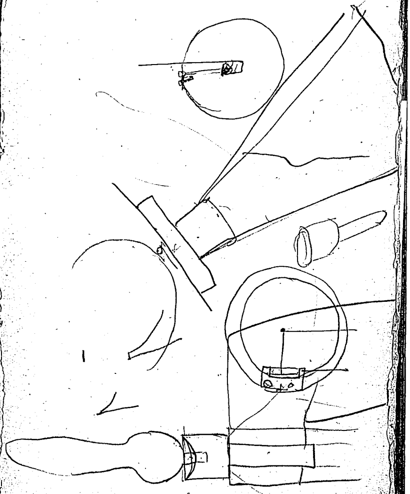
Crude | phonogram material, acetate Alumina + pumice soda.
" " flexible material,

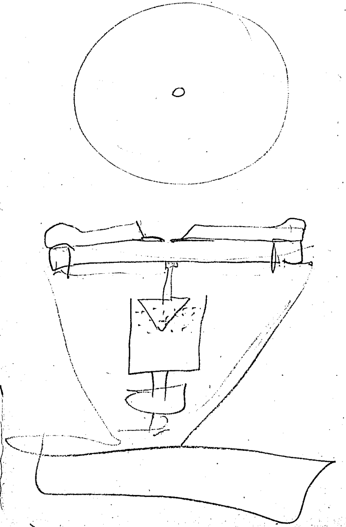
Insulating paper.

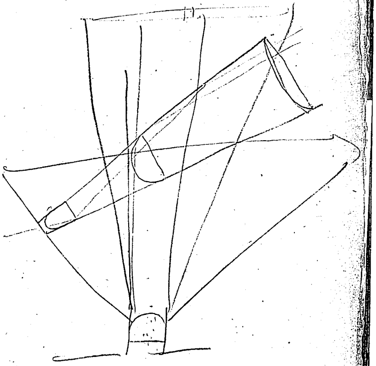
Chloroleate of Alumina for Varnish makers

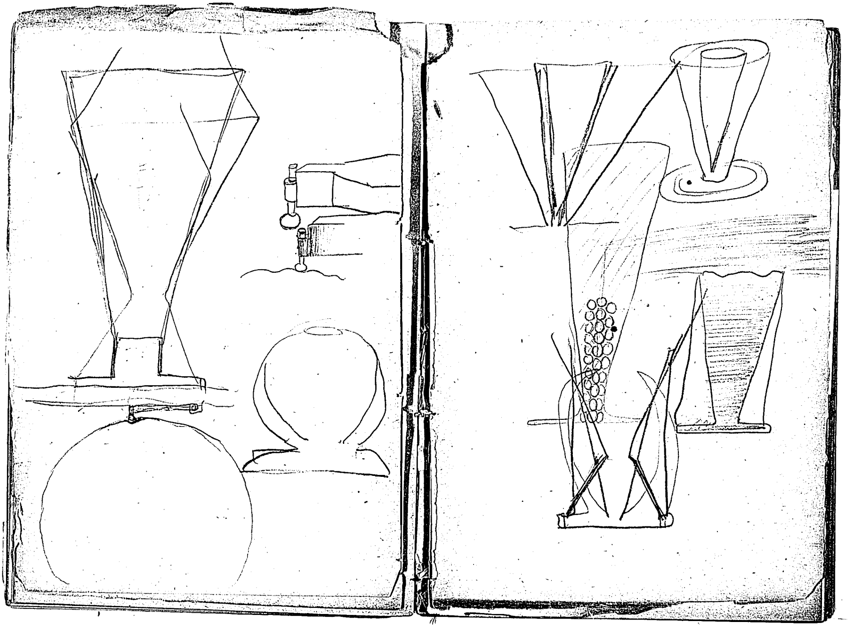
Purified Hg -
Plated Sieves
Material for filts
Peroxide Lead Electrodes
Oxidized Iron wire
Carbon buttons telephone
Electrolytic Zinc
Photograph chalks -
Hg Zincs
Kinetoscope materials
Pure Meter Solution
Insulating tape.
Condensers
fancy ~~transparent~~ paper for Candy etc

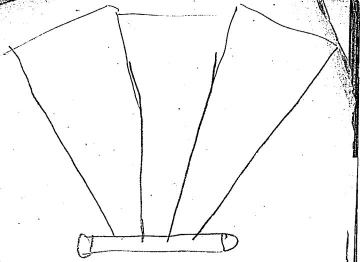


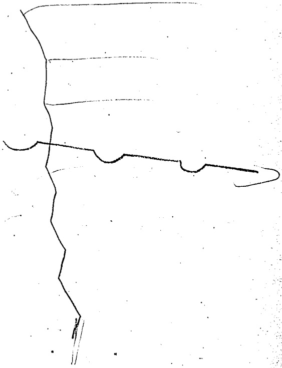


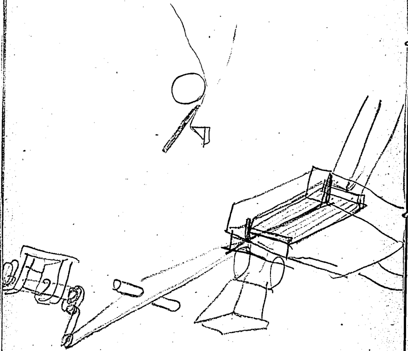


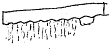


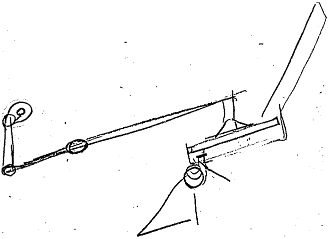






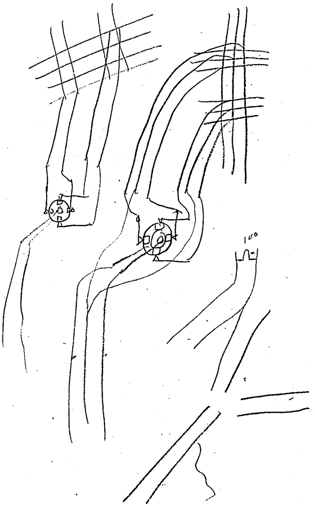


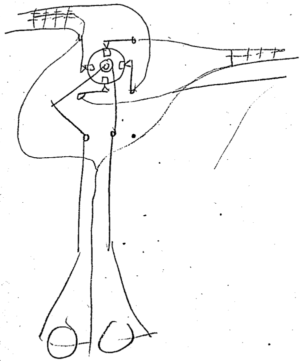




$\left.\begin{matrix} C_3H_5 \\ H_3 \end{matrix}\right\} O_3$ $\left.\begin{matrix} C_3H_5 \\ (C_2H_5)_3 \end{matrix}\right\} O_3$

$\left.\begin{matrix} PO \\ H_3 \end{matrix}\right\} O_3$ $\left.\begin{matrix} PO \\ K_3 \end{matrix}\right\} O_3$





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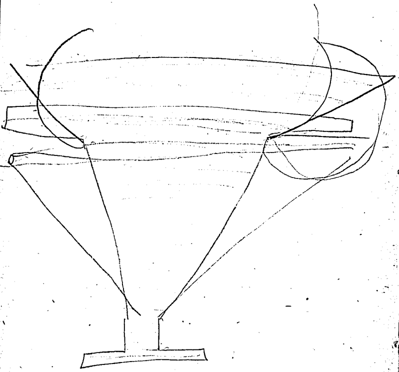

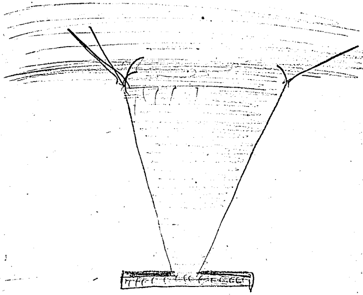

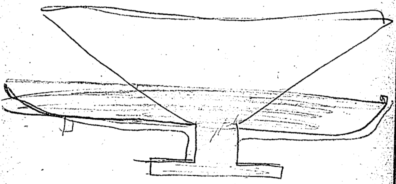

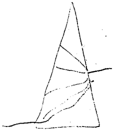

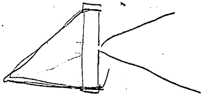

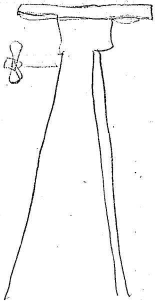

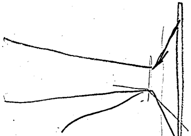

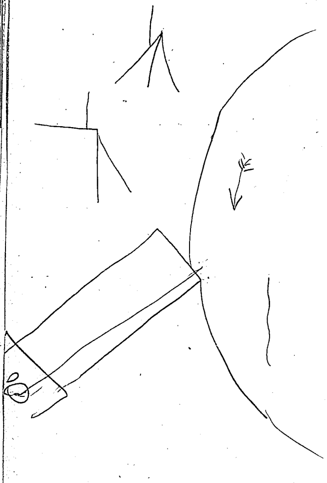

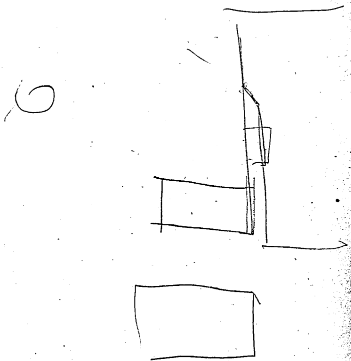

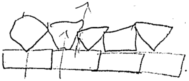

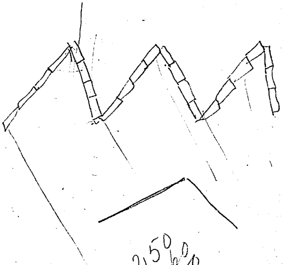

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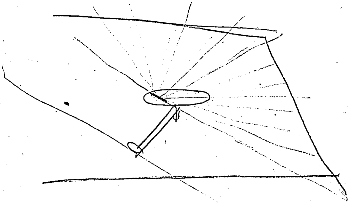

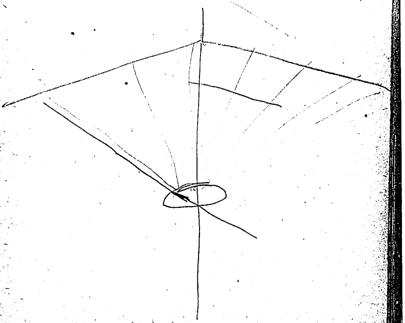

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[THIS BOOK WAS USED IN BOTH DIRECTIONS. THE FOLLOWING PAGES WERE FILMED FROM THE BACK END FORWARD.]

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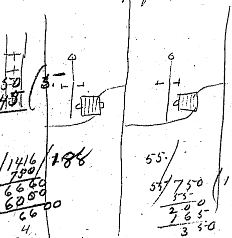

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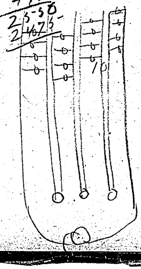

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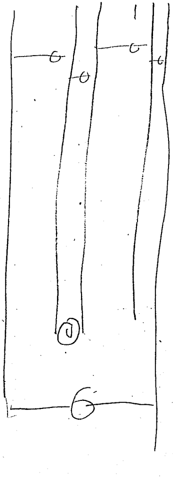

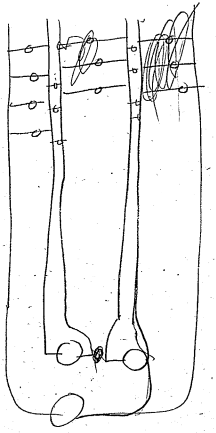

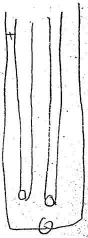

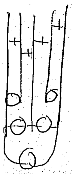

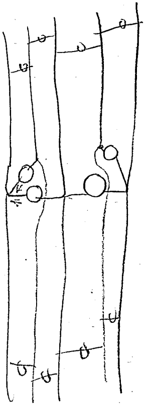

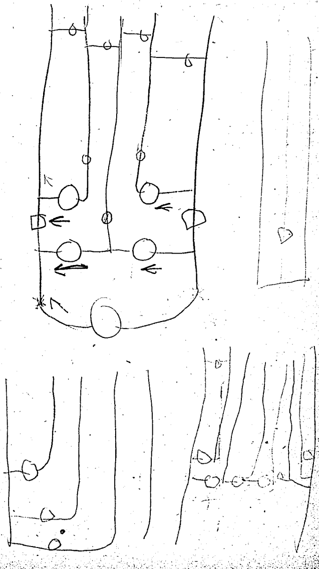

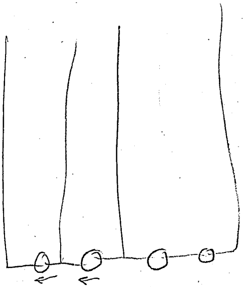

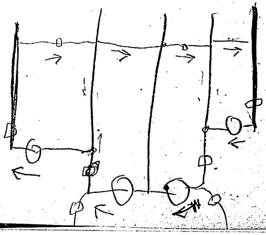

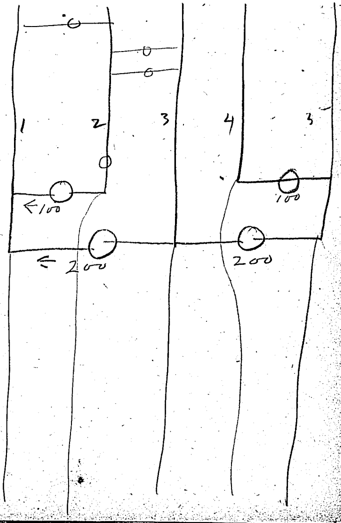
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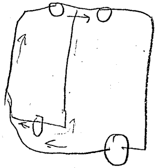

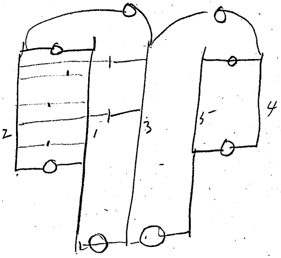

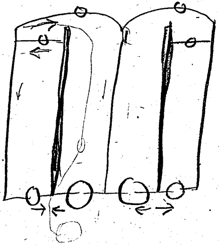

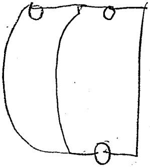

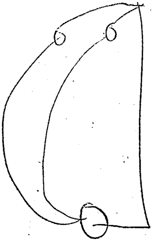

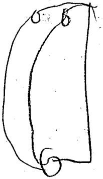

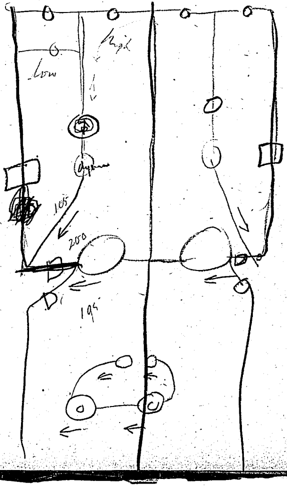
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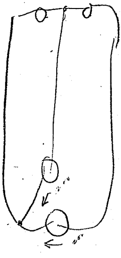

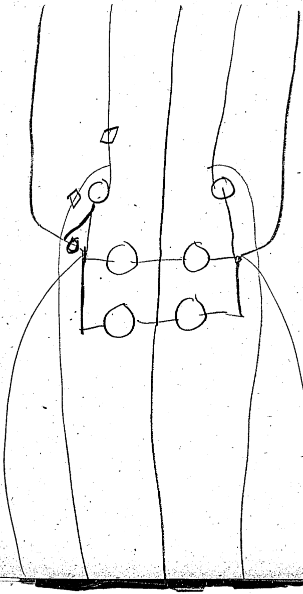

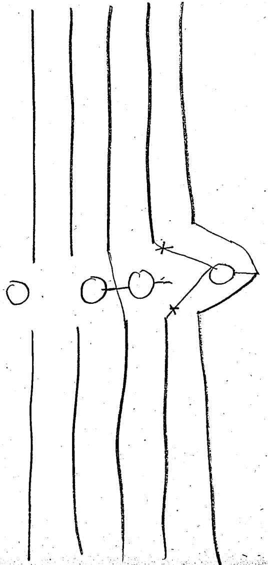

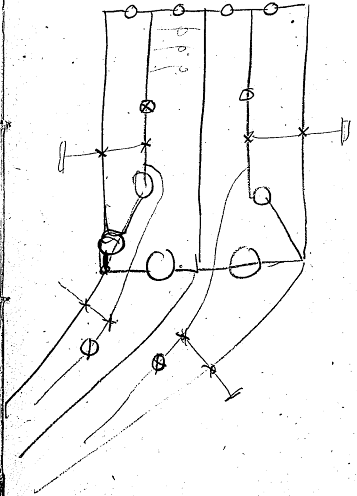

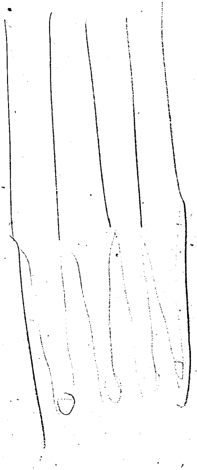

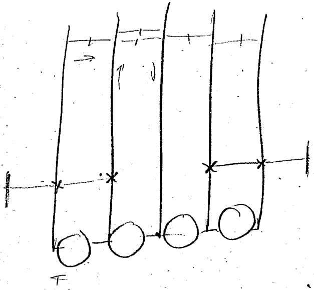

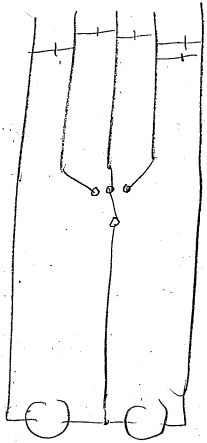

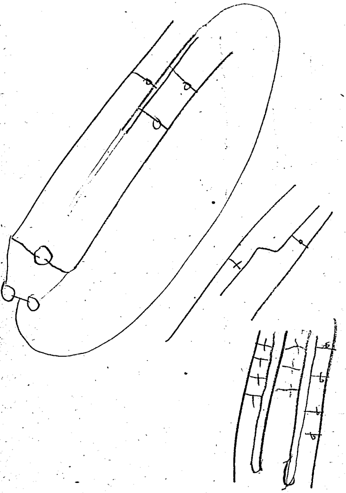

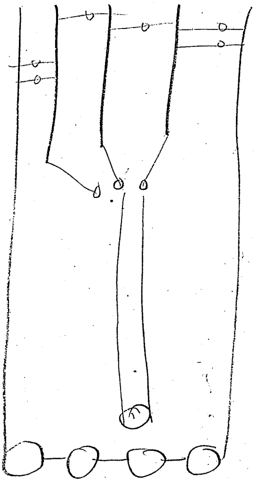

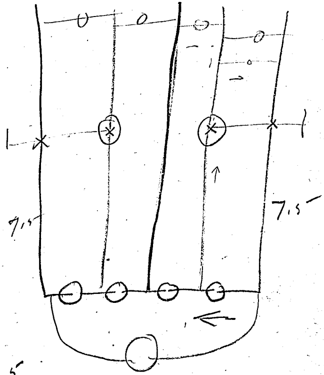

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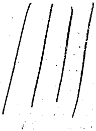

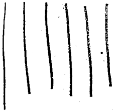

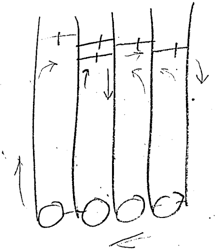

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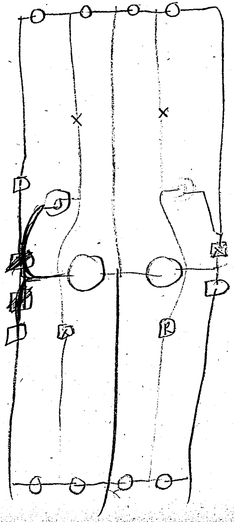

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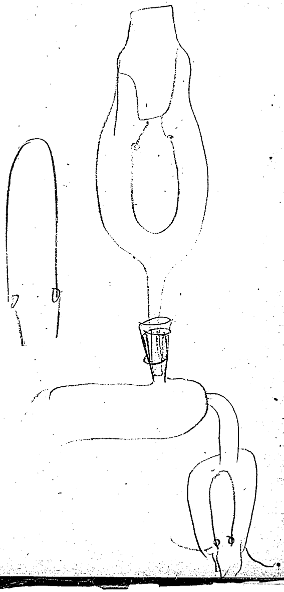

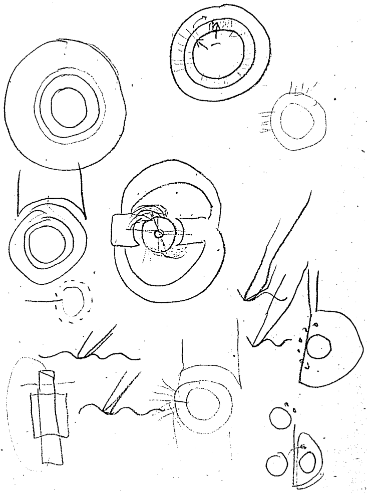

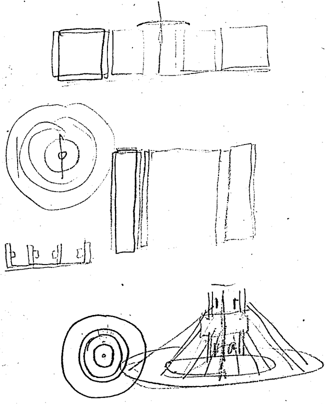

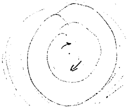

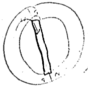

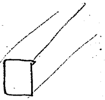

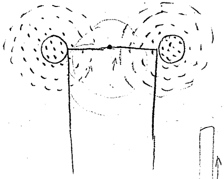

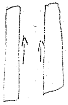

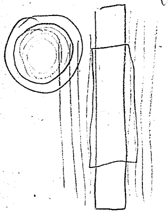

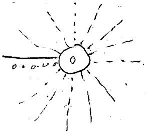

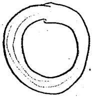

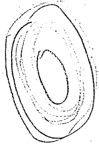

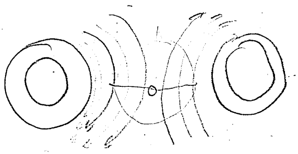

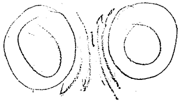

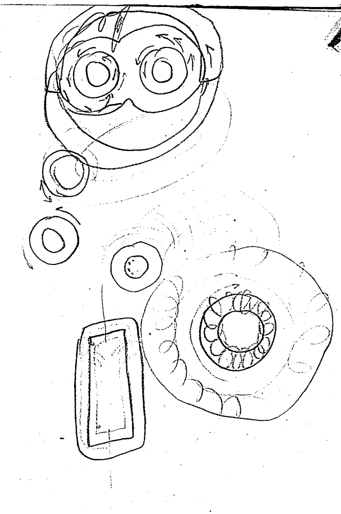

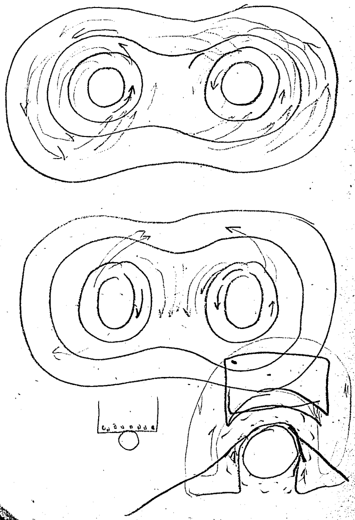

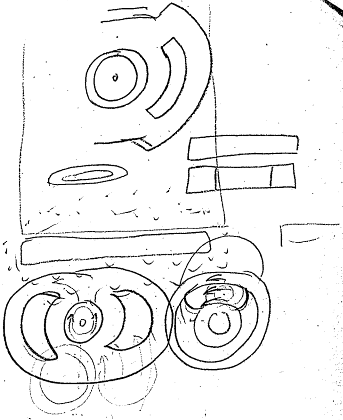

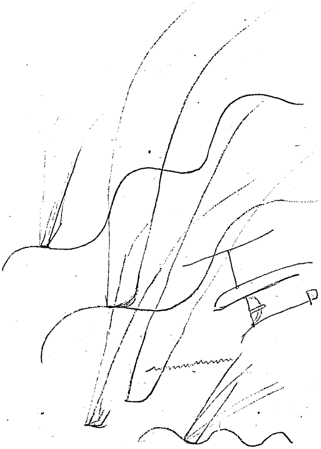

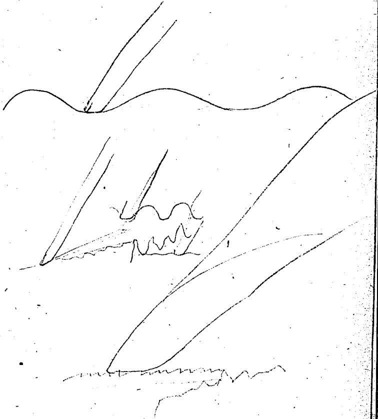

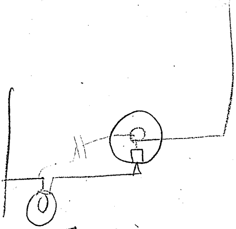

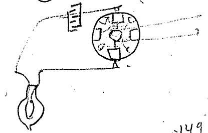

1 Lamp 75 watts .149

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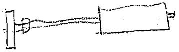

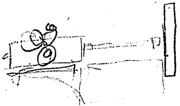

Lamp get Loss

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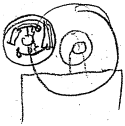

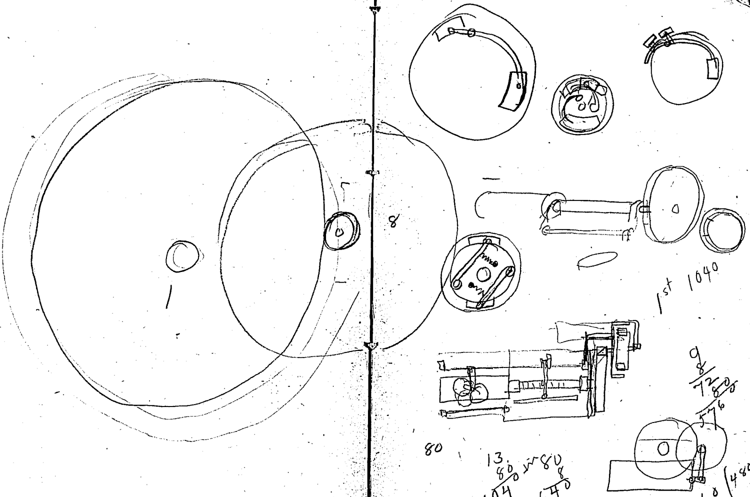

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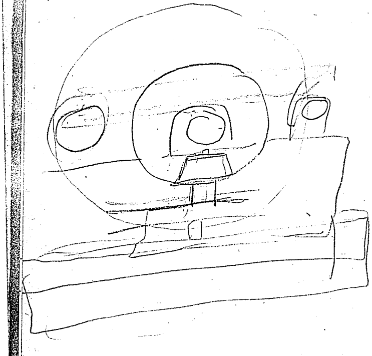

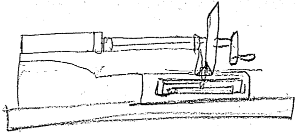

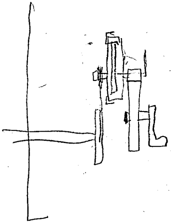

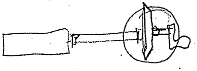

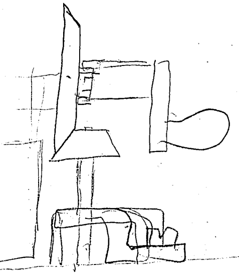

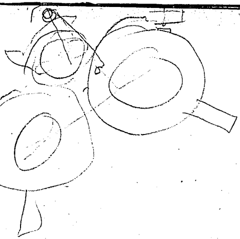

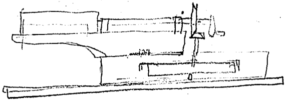

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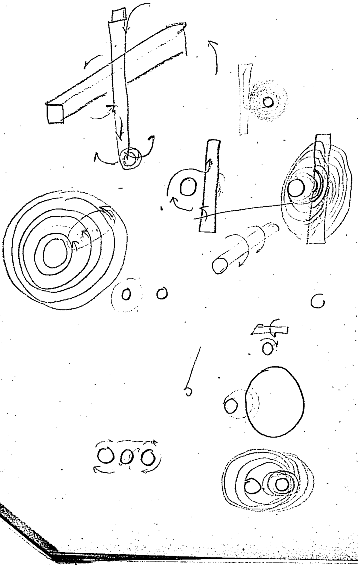

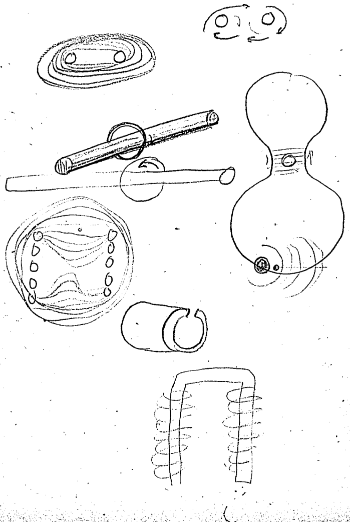

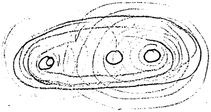

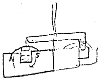

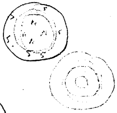

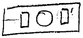

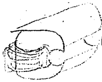

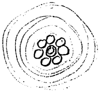

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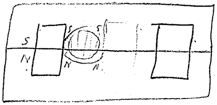

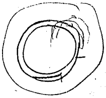

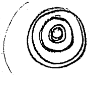

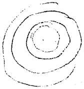

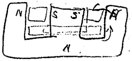

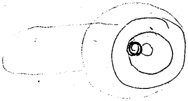

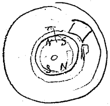

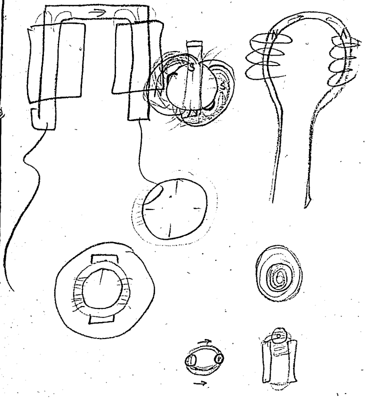
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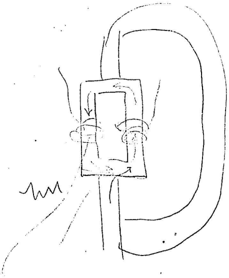
Notebook, N-87-00-00.3

This undated notebook was probably begun in 1887, but it may have been used as early as 1886. All entries are by Edison. Included is a proposed plan for the West Orange laboratory and a list of schemes to be worked there. There are also several notes and drawings about telephone experiments, a few generator drawings, and notes on miscellaneous electrical and chemical experiments. At the beginning of the book is an itinerary for a trip by Edison to Philadelphia, Baltimore, and Washington. The last several pages contain addresses of individuals and firms in Continental Europe. The book has been used in both directions. The first 25 pages are numbered. Approximately 70 pages have been used.



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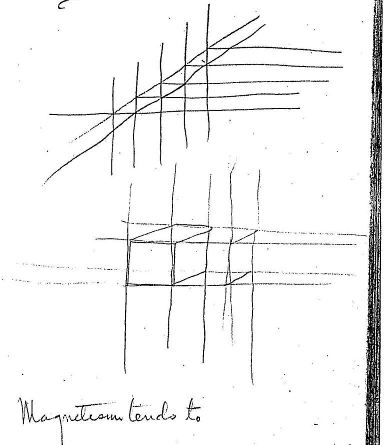
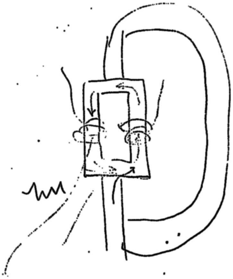


Magnetism tends to



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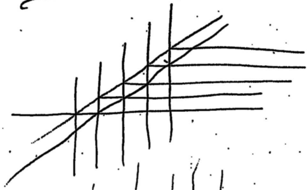

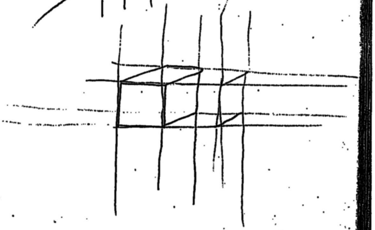

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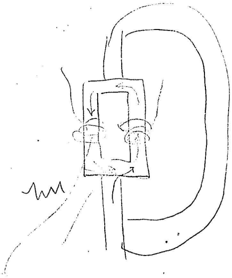

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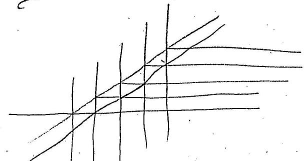

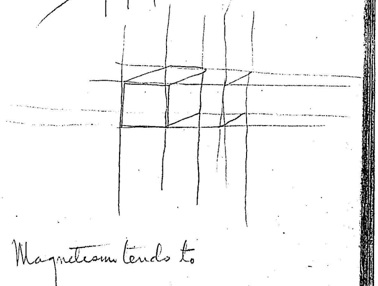

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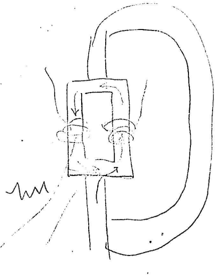

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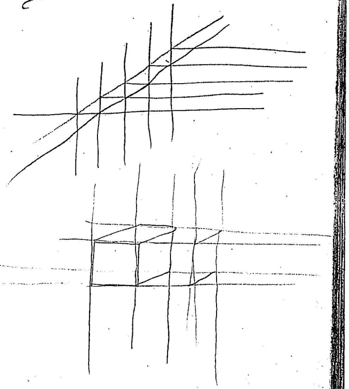

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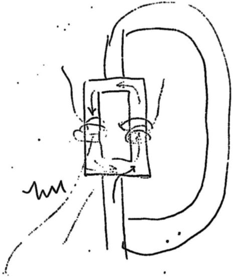

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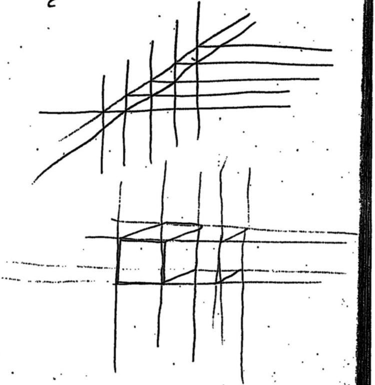


Magnetism tends to

Pages 1 to 25 numbered by [illegible] 8/1/64
N-(87-00.00.3)

1

Thursday Phila — ~~all night~~.
Friday [illegible] ~~Balt~~ all day + to
Wash at night — all night
Washn 5 all day —
Saturday [illegible] home
on B+O

Tuesday

Monday

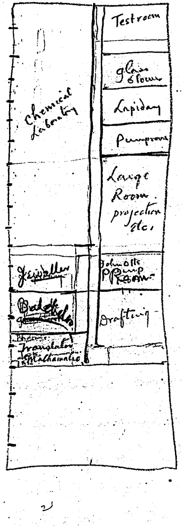
75

4.50

~~Thursday Phila + at night~~
~~Balto — Friday Balto +~~
~~then to Washn —~~

Wednesday phila + Balto
that night +

Wednesday
Wednesd


Testroom
glass blowers
Lapidary
Pumproom
Chemical Laboratory
Large Room. projection etc.
Jeweller
John Ott
Pump Room
Drafting
Translator
Mathematic

List of schemes to work at in new Laboratory —

Heating Metals by Current for mechanics Operation —

Extraction fibre —

Ore Seperator —

Industrial process for mfg Electro Chemically by Electrolysis & dynamo machines —

Aluminium —

Tanning —

Magno thermic motor & Battery

Magnetic Bridge —

Lippmann Mercury Meter

Ozone for bleaching — Nitric acid — ammonia etc by Houzeau Apparatus big silent discharge machine run by

power - alternating Etc
Converters -

Application in telegraphy Telephony
Electric Light & instruments)
of precision of Effect of
heat in alternating magnetism
of Nickel Cobalt & iron

ditto that magnetism
diminishes the resistance
of iron & the magnetic metals
See if it effects iron/salts
with unpolarizable Electrodes

Motograph to be worked
up in all possible applications

Artificial Silk

Moulding Compounds for use in the arts -

---

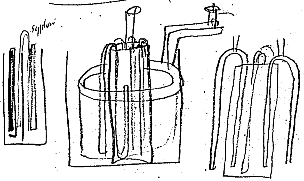
infusible flexible insulation,

Ampliphone -

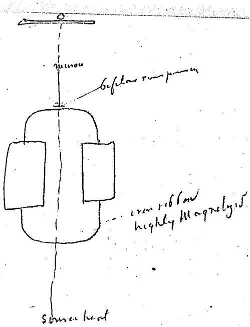
Watts Dic. 3rd Sup. Pt 1 - p 708 -
Resolution increase or diminish by heat of batteries. Cooling Daniel cell to -10 Cent, Res increased 25 times.
~~[illegible]~~ Carbon cell at -15° C. 20 times & Emf diminished $\frac{1}{10}$ —
hence try both in sealed 9/98 tubes with pressure valve to blow at 350 - & heat & get internal Res.
also a table to be published of the increase of conductivity of a Daniel Bunsen & other batt by rise of temperature also

Change in Emf — on commercial Cells & on pure zinc & chemical Cells — starting 3 or 4 degs from Freezing point —

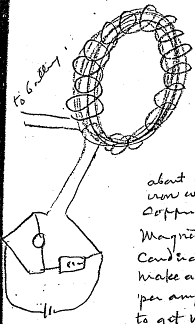
An investigation as ~~the~~ to the change of resistance in batteries due to increase in size of positive & neg Electrodes so as to fully show which Electrode diminishes internal Resistance the greatest by increase of size —



Lot of syphon glass tubes to replace porous cup & by this means prevent diffusion.



Closed magnetic ckt $\frac{1}{1000}$ pure iron or $\frac{1}{5000}$ if possible short magnetized needle on bifilar suspension - in front of spot where heat beam is focussed - the heat causing diminution magnetic permeability at this spot & makes free poles —



about 1000 ohms fine insulated
iron wire surrounded with
copper wire & magnetized
Magnetization decreases
Conductivity of iron (increased hard steel)
make a table of resis
per ampere spire &c -
to get value of this
phenomenon for practical
application —

Watts 3rd Sup pt 1 p 719 - states
res diminishes at square current
but gives no data for starting
point of value or amount of
Change with given Current.

Collect up Literature of Effect Light on Selenium & see if it has Ever been arranged in Vacuo so as to get Constancy of Condition of not Make a Vacuum Cell & Experiment,

---

Read up see if glass has Ever been pressed flat through dies if not ascertain if it can be pressed out through long flat die to make window glass same as lead pipe is made —

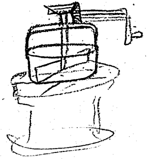
Acurate & Scientifically
Conducted Experiments on
the exact melting points
of metallic filaments in
Vacuo arranged like a Carbon
fil & in Volt ampere apparatus
to read continuous as heat
rises — also McLeod guage
to measure gas coming out
due to heating —

Prepare about 1@2 lbs of every
Soluable Carbonizable material
for dipping — its probable that
Every material will on Carbztn
give a different surface No 6 160
Cp hp No 17 178 Cp hp —
prepare asphaltene way up as far as
Can go without Carbonization
Try and dissolve that black residual

Coke from Oil Cos retort in paraffine or other high boiling point Coal Tar product -

~~make some Carbon monosulphide~~ -
~~also Graphitic acid [illegible]~~ -

Take common asphalt, melt and stir for several days until it becomes impossible to stir it & not burn it more than possible. a hand stirrer should be rigged up



Then pour & scrape it out to Cool - take a portion say

Exactly one lb powder finely 100 mesh then act on by following menstrua to dissolve out the various compounds —

Alcohol, — then Ether — then mixture Alcohol & Ether, then Ammonia, ~~Then Water~~, Then gasolene, then Chloroform — then several of the Essential oils, then ~~Bl Naptha~~, ~~[illegible]~~ Water Strong hot alkali — strong HCl — Then Naptha, Bisulphide Carbon Benzol. Spirits turpentine,

Use a small portion of the powder (not the lb) in test tube for a preliminary trial as I want to reserve the Major part of the lb for the remaining & best Solvents object a final Bitumen that neither softens or melts

Take another lb of Asphaltene, dissolve the whole in Benzol & allow it to settle perfectly then distil Benzol off — ~~dos~~ this will eliminate the Ash & inorganic materials as well as solid Carbon —

Then act on residue with Every solvent which does not appear to go for the general bulk of the residue,

Try boiling Vasalene, paraffine ..

Make Solution of amber in any Solvent that can be distilled off — this best general Solvent,

Then after distillation treat with the Various inferior Solvents to eliminate More fusible resins,

Same with Zanzibar Copal

Try Caoutchouc in Benzine Chloroform or best Solvent, dip

Varnishes -

Powdered Copal gradually added to sulphuric Ether in in flask with Cork shaken at times for 24 hours, 5 pts Copal 2 pts Ether - used for repairing the glazing of enamels -

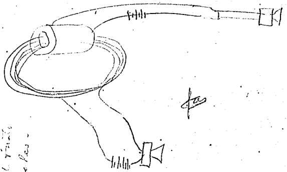
In 17 use small trough and mix as much ignited lampblack as it will hold in suspension -

ditto Electrotypers Lampblack

ditto ignited Charcoal -

form fils by using single
fibre Ramie or Silk, Shellac.
& successive dips in 17.
also others which only
soften but not melt,
also ignited Charcoal or Lampblack
held to saturation in suspension.
also Oxides Zircon -
Magnesia Alumina -
Calcium —

Mix Linseed with 17.



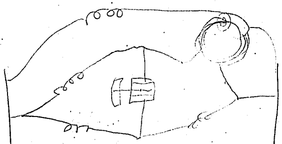
[illegible]
Metal is effected
strongly put in bridge &
no powerful current
in coil & there
change has -

Coil fine wire several cells & telephone in ckt. This magnetizes the coil of fine insulated iron wire say No 20 iron wire in whose ckt is Carbon telephone & battery

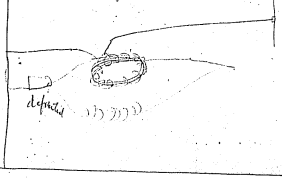
Electric Current increases & decreases amount magnetism when sent through iron, hence induced current will be sent into coil & to receiver perhaps this will be sharp & — This Best reg induction coil as there is no [illegible] of lines of force — The more powerful battery is on Copper Coil the better —

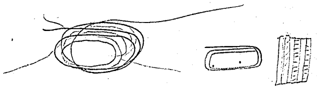
also reverse the operation put Transmitter in Copper coil with battery use very fine wire 36 in reg + make resistance several hundred ohms - put receiver in with + without battery -

Magnetism increases resistance of iron wire to Electric Current,

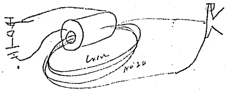


The above principle applied to Volt meter.

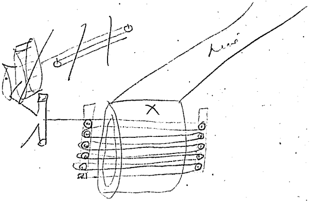




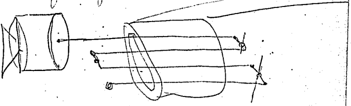
Induction Coil for telephone
Consisting of a ring 2½ inch
dia wound with No 20 & 36
iron wire side by side if possible,
Trans on No 20 - whole acting
as an induction coil & magnet
think will get sharp waves

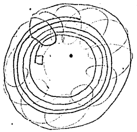


get Molecular Knock of string
Try Trans in place Key —

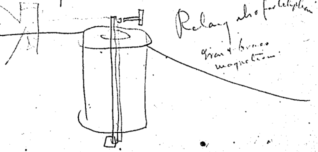


Telephone Receiver magnetism owing to Contact — 30 or 4 feet of iron wire as Core of X.



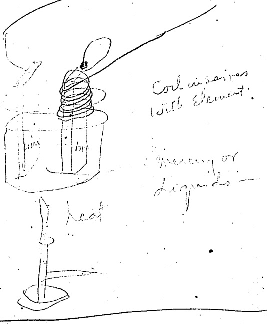


Breguet spiral brass + iron magnetism tends to straighten iron hence indicate as Voltmeter or Ampmeter also work diaphragm of telephone.

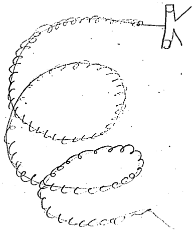


Relay also for telephone

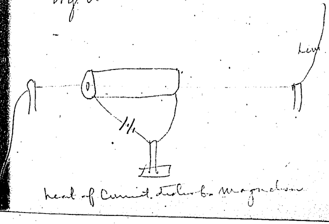
iron + brass magnetism



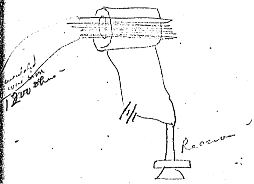
If melted Litharge is conductor use heat & immerse, Carbon Electrode & Iron or some other Electrode not readily oxidized Try Cu - Ni - C. — also an Electrode that will alloy with Lead or Lead will stick to



130 ohms wound round
a No 23 @ 26 iron insulated wire
Knock to work telephone — also
try it stretched —



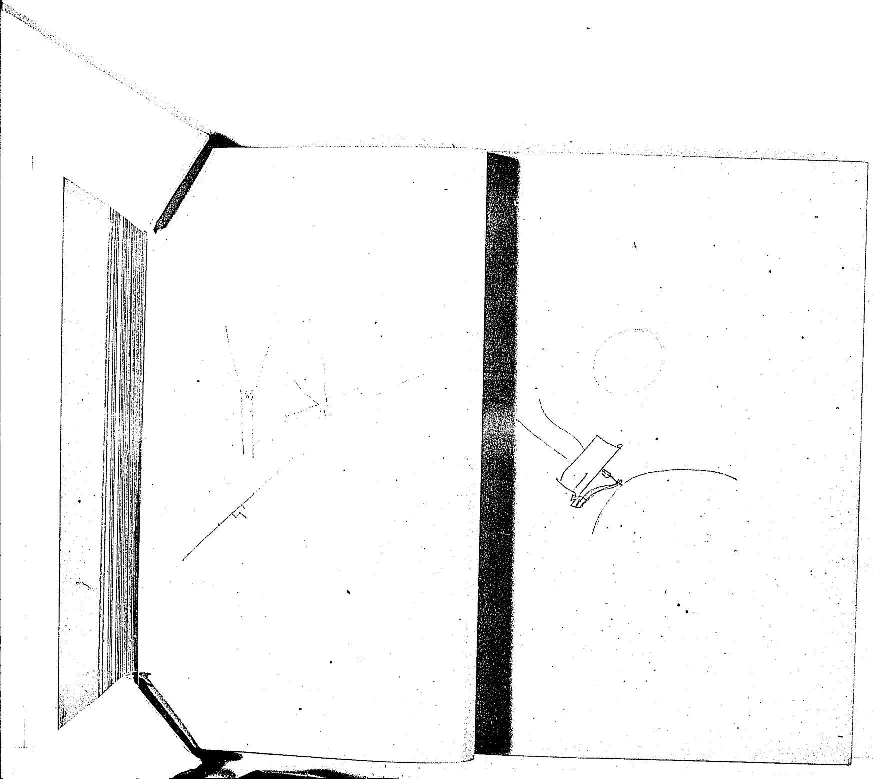
heat of Current. disturbs Magnetism



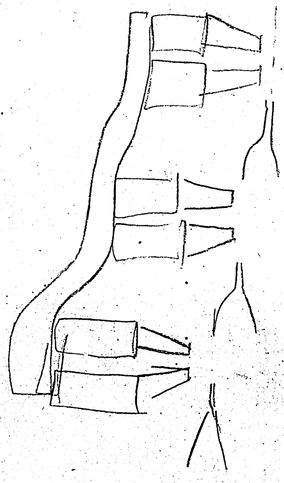
Current from trans heats Condr in core & diminishes magnetism which throws induced Current in Recvr Nickel wire probably be more sensitive

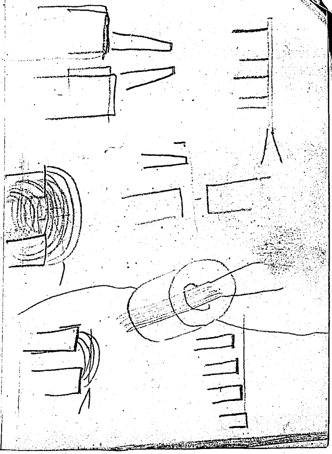
---

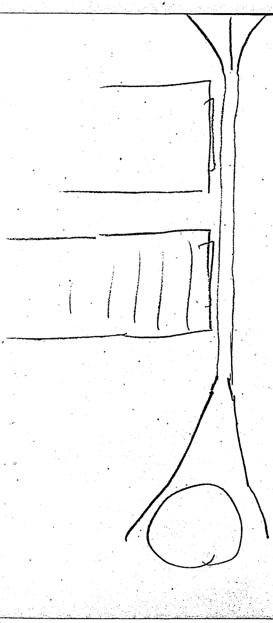
Standard of light, in Vac that point with [illegible] wire where it kicks This might be a standard of nature for great many things

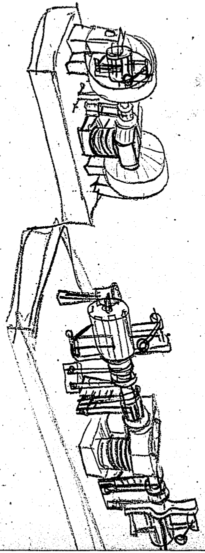


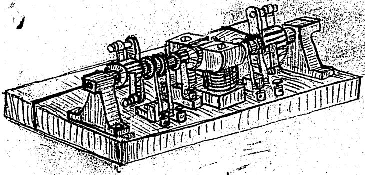
[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]

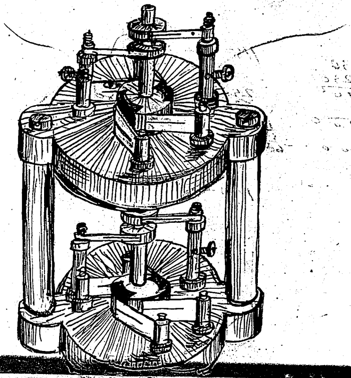












300

2.80
280
22.4
5.60
7.84

115—

250
250
125
50
62,5

140—

230
230
690
460
52,9
40 000

A Aubry
Boulevard St Michel 6
Paris France

M Baffe Rue Arago 1 Alger
France

M Balbreck Boulevard Montparnasse
81 Paris France

D Baraban Rue St Honoré
175 Paris France,

M Barthélemy Rue Dauhine
16 Paris France

Cyrille Baudet Rue Favart 20 Paris France

Ch Beetz Rue Rochechouart
45 Paris France

Billault et Billaudot 8
Rue de la Sorbonne 22 Paris France

E Bisson Boulevard de Strasbourg 9
43 Paris France ✓

J Bizot Aix-en-Provence 10
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J Blondeau 11
Avenue d'Orleans 29
✓ Paris France

Claude Bourget 12
✓ Rue des Augustins 14
Lyons France

J B Braqet
Rue Petit St Jean 38 13
Marseille
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14

M Buffe
Rue Arago 1 Alger
France
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Rue Vieille du Temple 82
Paris France
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H Chapuis
Rue Greneta 36 Paris France

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Charrière et Cie
✓ Allevard Isère
France

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Galerie de Valois 158 Paris
France
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Fontaine l'Évêque
France

M Delamotte 21

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Rue Claperon 25 Paris France

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Rue Cherchell 16. Marseille
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Ch Duterne 28
Rue Blainville 11 Paris
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Boulevard St Germain 94
Paris France

EF Flogny 30
Rue Lemercier 81 Paris France

M Gary 31
Rue Ste Eugénie 22 Paris France

P Gautier 32
Montfort, l'Amaury
(Seine-et-Oise)
France

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Rue du Chemin Vert 42 Paris
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Rue du Bouloi 7 Paris France

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Rue de Bellechasse Paris 7 France

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Boulevard du Temple 77
Paris France

Em Guérin 41
Rue Montmorency 5
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O. Hempel et Cie 42
Quai des Grands Augustins 55
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Kahn et Schumann 46
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J. Larmenjat 47
Rue Chauveau-Lagarde 18
Paris France
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Lequy et Fils 48
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Paris France
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17
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Rue St Florentin 11
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Dr E Boettcher
Leipzig Germany

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Neu Kolln a/W 16 5
Berlin
Germany

Schwartz & Co 1
Koch Str 73
✓ Berlin. Germany

Egger, Kremenezky & Co
Grunethorgasse 19
✓ Vienna Austria

J Einstein & Co 6
✓ München
Germany

Joh Fraas
✓ München
Germany

Ganz & Co 8
Schwartzenbergplaz 6
Vienna austria

Piette & Krizik 9
✓ Pilsen
Bohemenia

Sigmund Schuckert 80
✓ Nürnberg
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M Aleiter ✓ Mainz Germany 1

M Bischof
Oranienburger Str 75 ✓
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A. Bornhardt. 4
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Gumpendorfer Str 6
✓ Vienna Austria

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Wilhelm Eck 9
Wilhelm str 121
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Germany

Jh Findeisen 90
Jager str. 75
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Brockenheim
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R L Haviland 4
Stross in Himmell 3
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M Kunzemann 7
Oranien Str
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J Lotter 8
Frankfort on the Main
Germany

Mahler & Eschenbacher 9
Maximilian Str 11
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George Mayrhofer, 10
Wipplingerstrasse 27
✓ Vienna Austria

Gebr Meer 1
✓ M-Gladbach
Germany

M Oettel 2
Schmid ✓ str 31, Berlin Germany

M Peschel 3
Muller str 3a.
✓ Berlin Germany

M Queva 4
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Mullerstrasse 48c
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C F & W Reinhardt 6
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M

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Taborstrasse 20
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Glasfabrik-Actiengesellschaft
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M G Wilhelm 1
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✓ Oberweisbach
Thuringia Germany

Winzer & Uhlig ✓
Stallschreiber str 59
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Germany

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Fischerbrucke 2
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Schmid St 42
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Gebr Strauss
U d Linden 44
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Grunstadt 3
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Germany

Constantinhutte bei Freiberg 4
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Th Degenring 1
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Germany

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Zwickau Germany

Gs Grafner & Co Pulsnitz 4
Germany

Höffmann & Zinkeissen. 170
Zwickau
Germany

Holterhoff & Exner 1
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Germany

Johann Gallinger
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Buss Somart & Co 6
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Rob Buchholz
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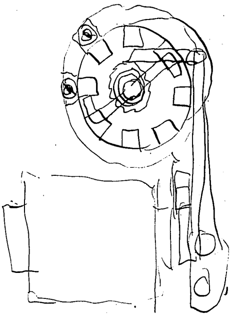

Gebr Heine 8

Offenbach a/M
✓ Germany

Prinz & Blacke

✓ Altena 9
Germany

Montefiore Levi
Chaussée de Mons 10
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Belgium

A Cruto & Cie
Turin
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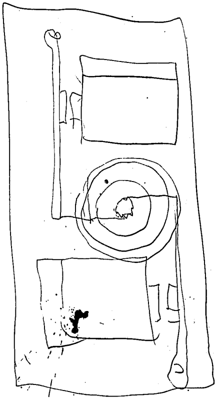


LM Ericsson & Co ✓
✓ Stockholm
Sweeden

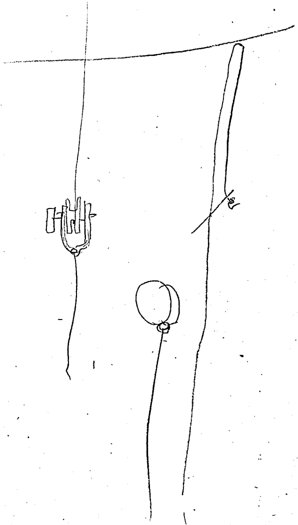
Zellweger & Ehrenberg +83
✓ Uster
Switzerland

Notebook, N-87-00-00.4

This undated notebook was used by Edison, probably in 1887 and 1888. It contains drawings and a few notes regarding phonograph designs, including one drawing labeled "phonograph movements for 1878 model." The front cover and spine are both labeled "1." The pages are unnumbered. Approximately 80 pages have been used. One loose page has been inserted into the book.

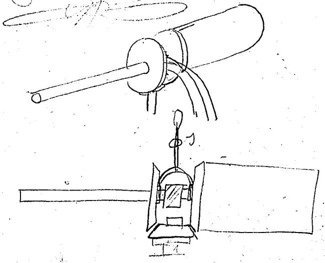
X E-172

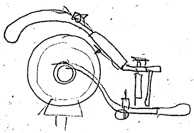
N-87-00-00.4



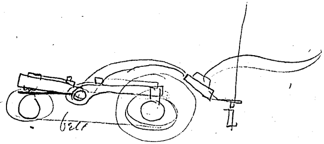
Phonographs movements

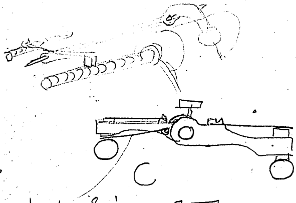
for 1890 model



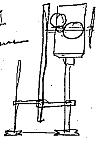


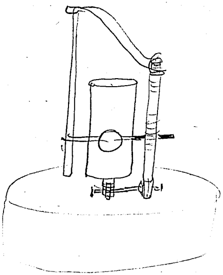
Lifts then shifts

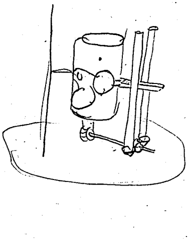


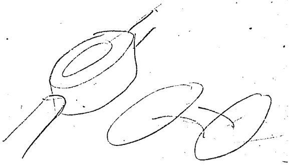


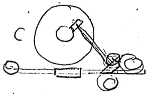
Limiting Spring
to hold steady
little more pressure
to reverse

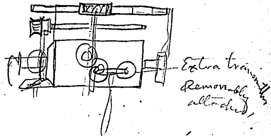


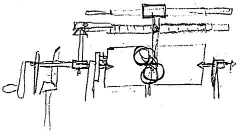


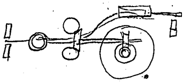


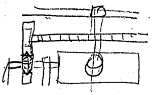


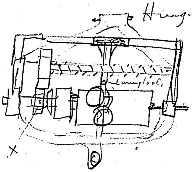



Extra transmitter
Removably attached

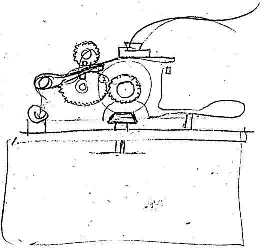


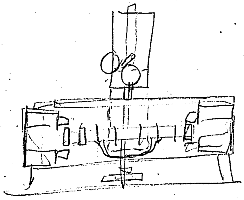


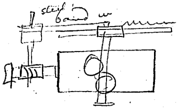


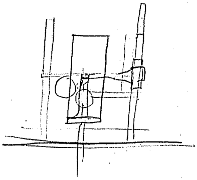


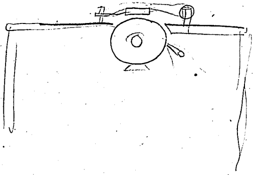
Whole top phono app lifts off the motor to stop - double screw to reverse & multiplying gear

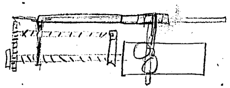


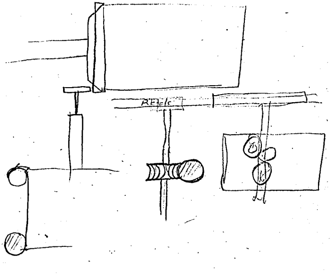


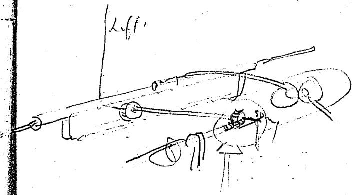

steel band w








Rack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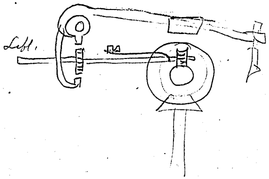
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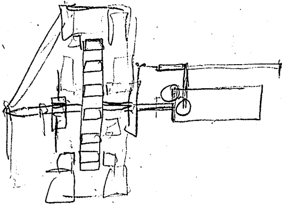

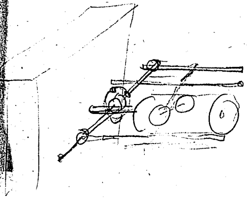

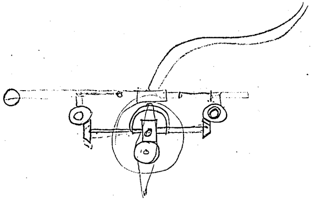

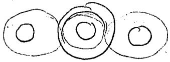

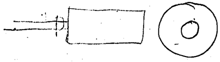

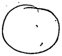

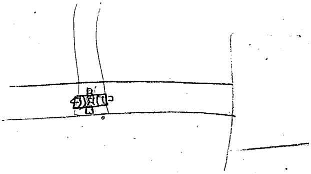

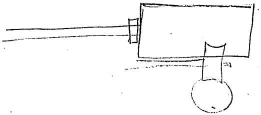

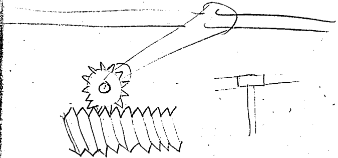

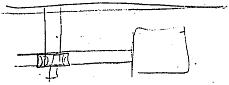

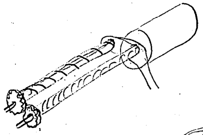

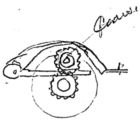
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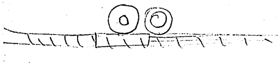
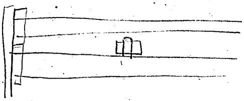
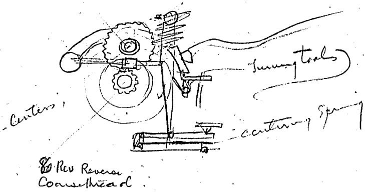
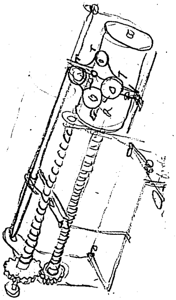
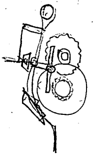


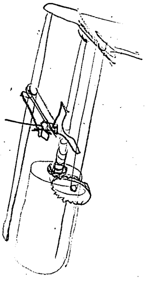


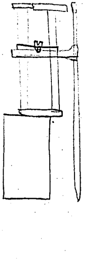
50 threads but slower 125 per inch
60 per inch say

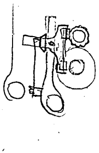


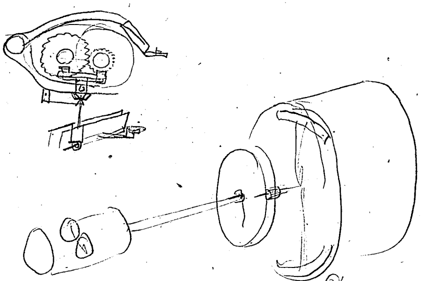




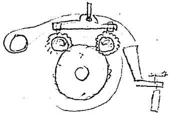


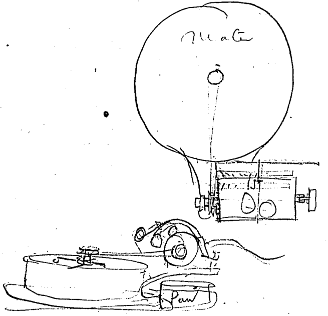


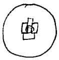




Gomme dans ces
gorges.







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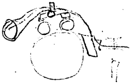
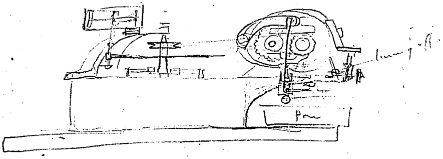
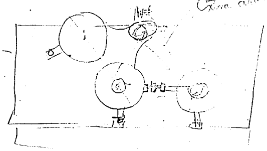
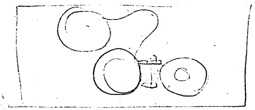
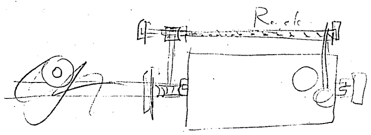


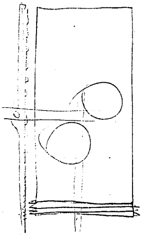


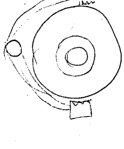


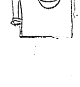
Extra [illegible] capital

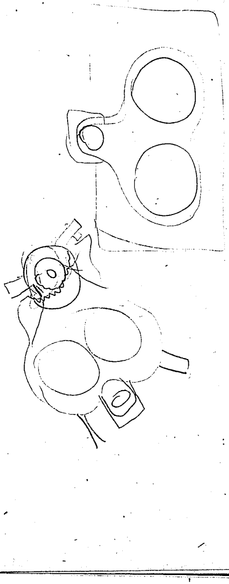


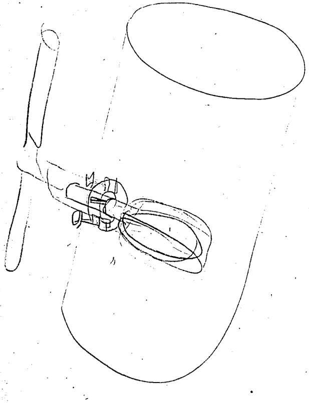

Rack

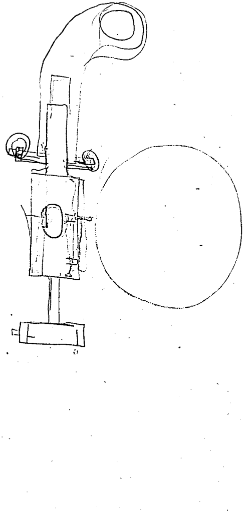


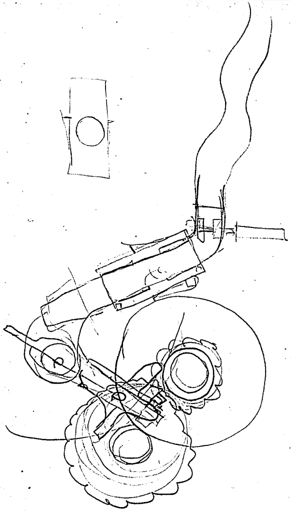


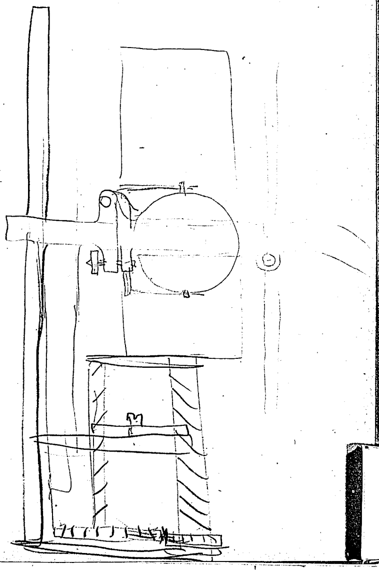


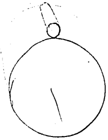


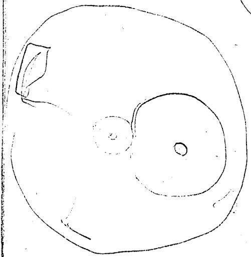


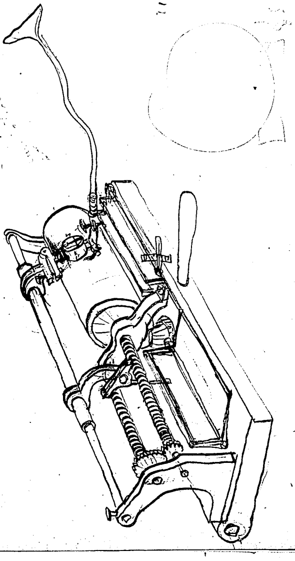


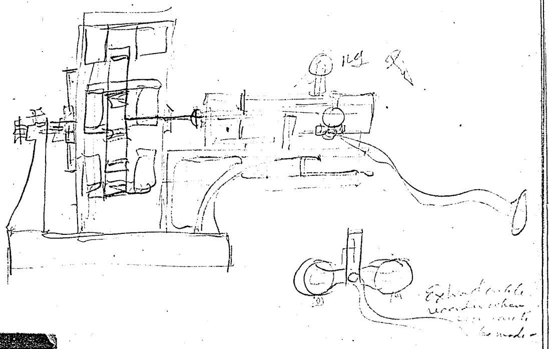


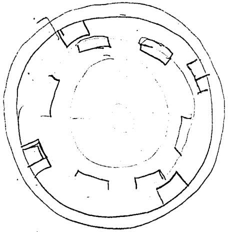


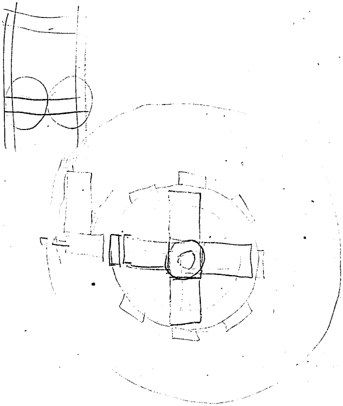


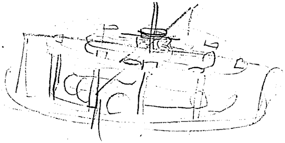


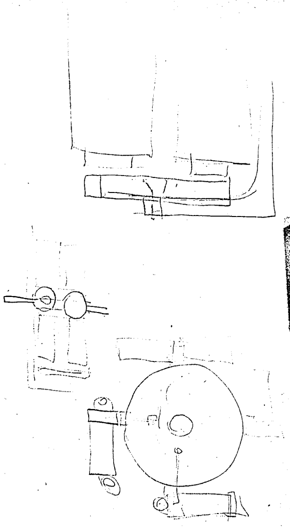


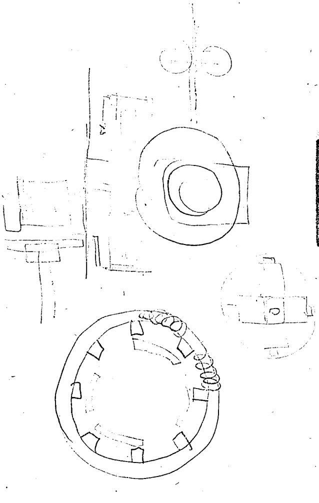

Exhaust cable
[illegible] when
[illegible] can't
be made –

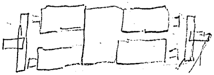


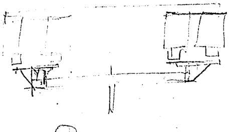


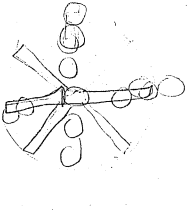


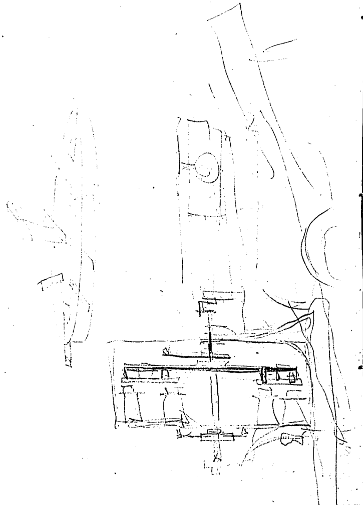


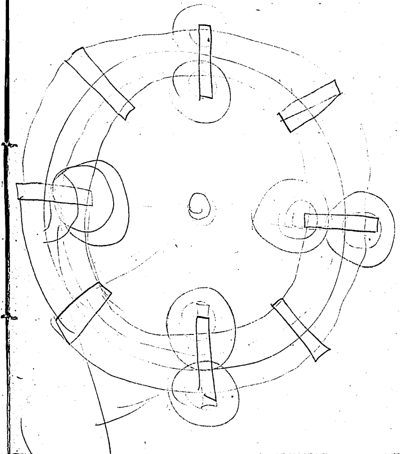


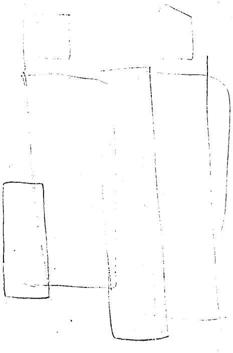


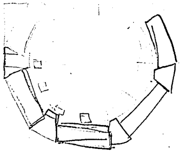


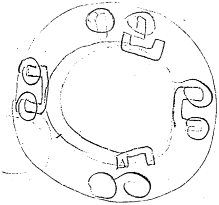


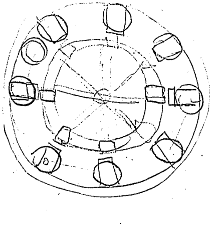


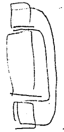


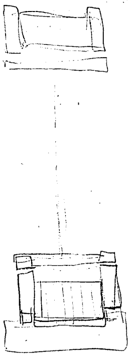


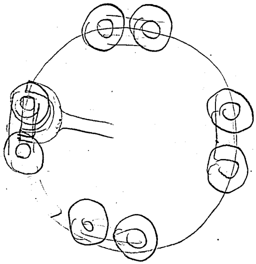


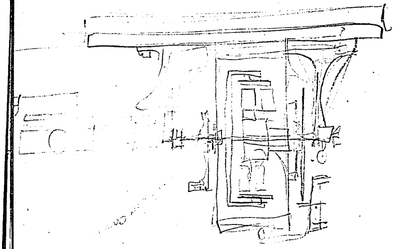


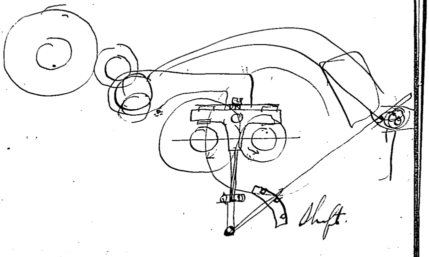








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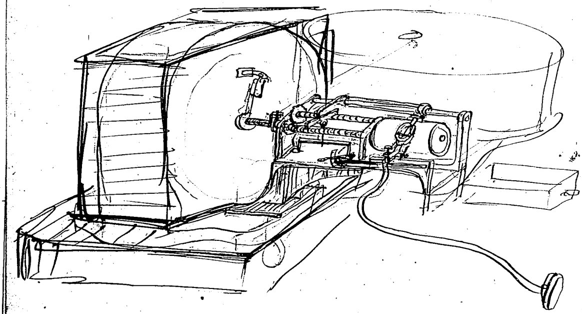
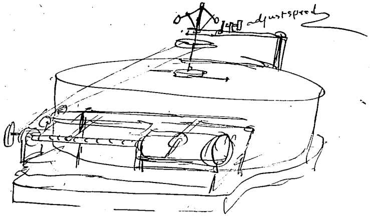
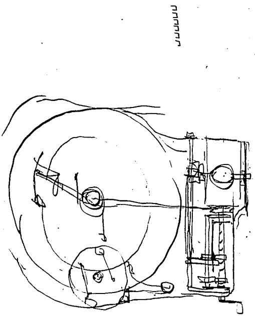
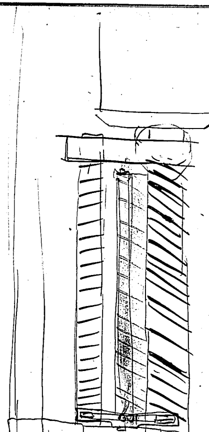
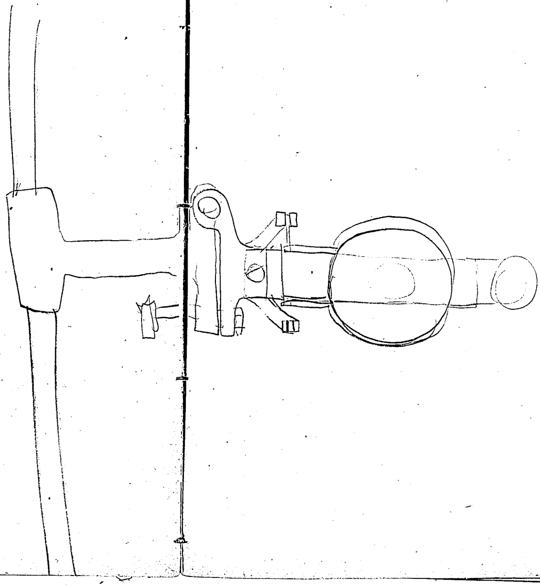
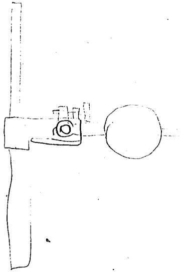


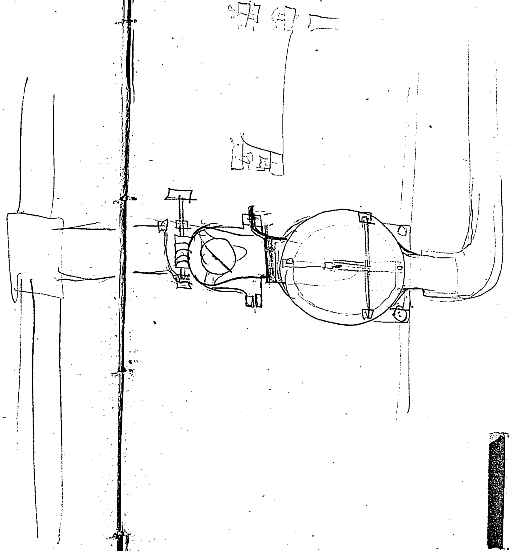

adjust speed

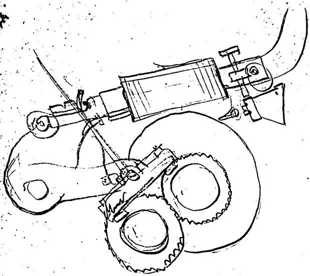


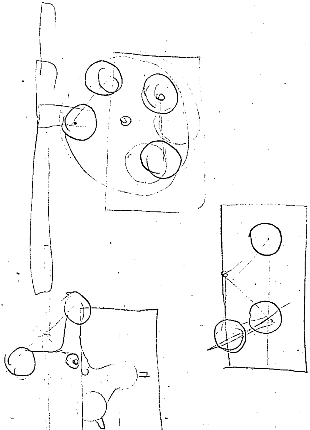


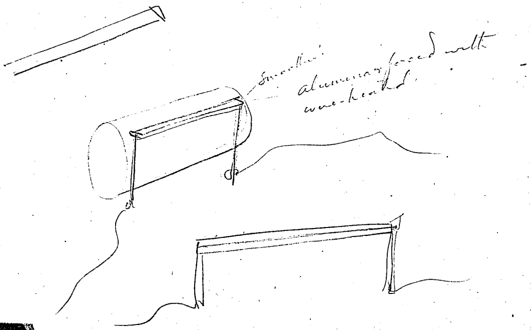


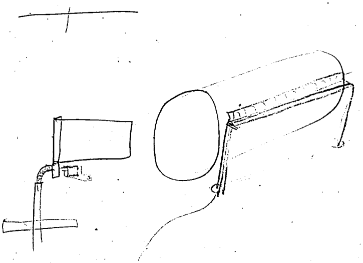


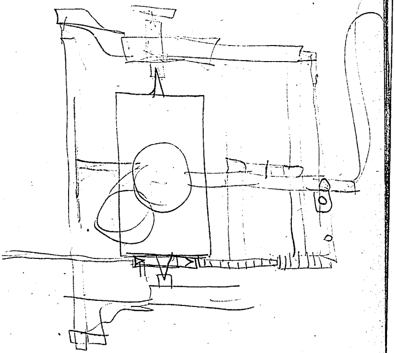


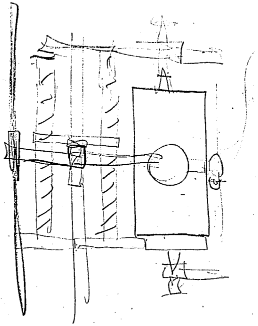


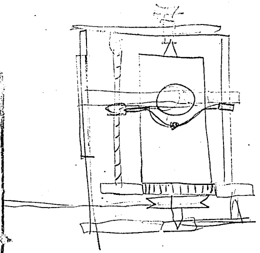


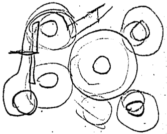

Smooth
aluminum faced with
wire-heated.

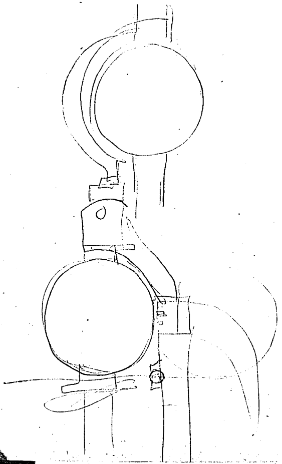

sheet plate
Smoother

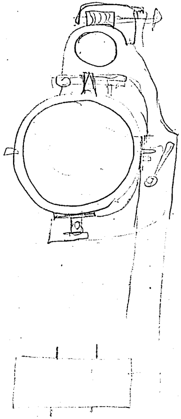


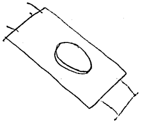


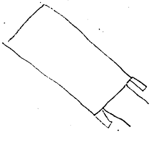


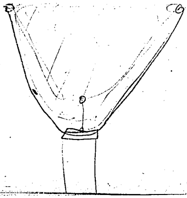


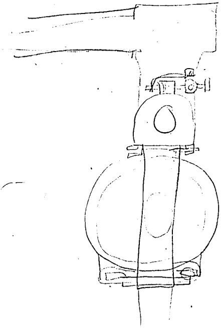


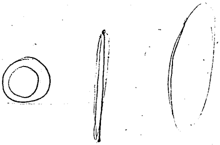


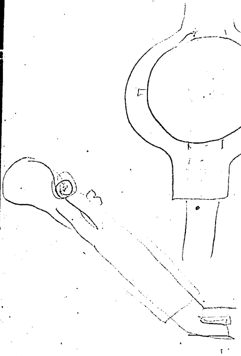




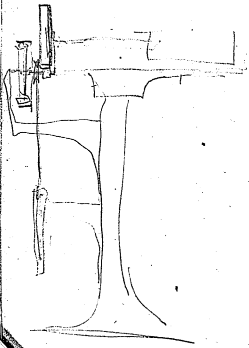


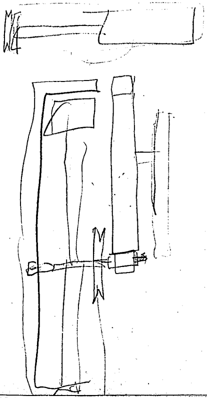


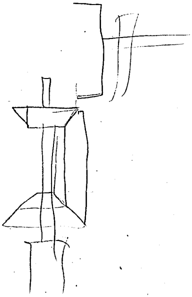


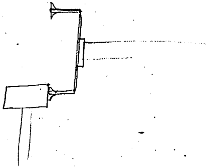


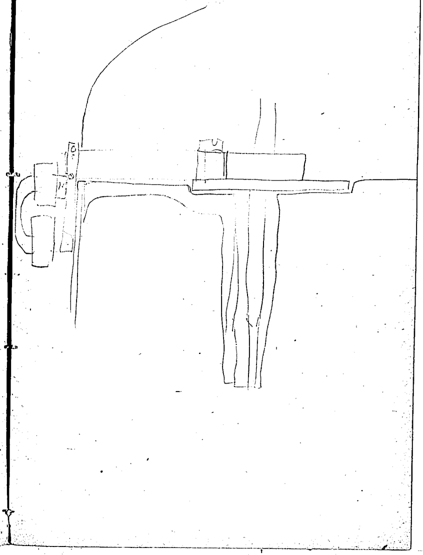
3

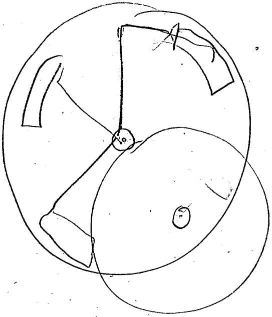


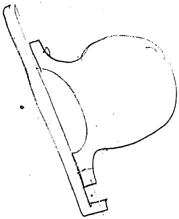


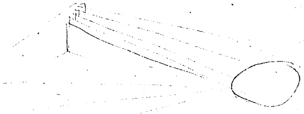


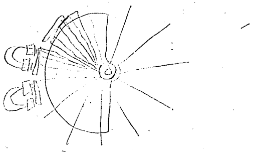


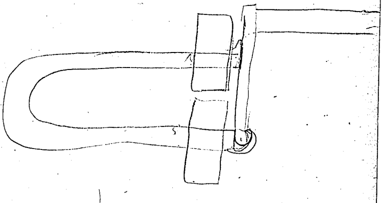


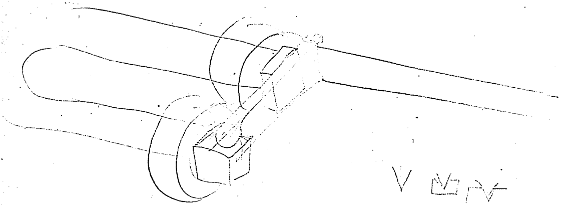


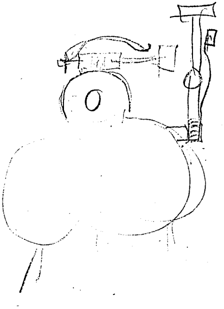


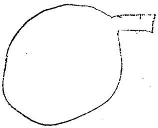


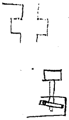












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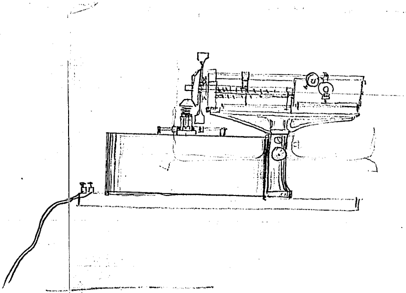

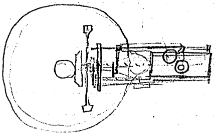

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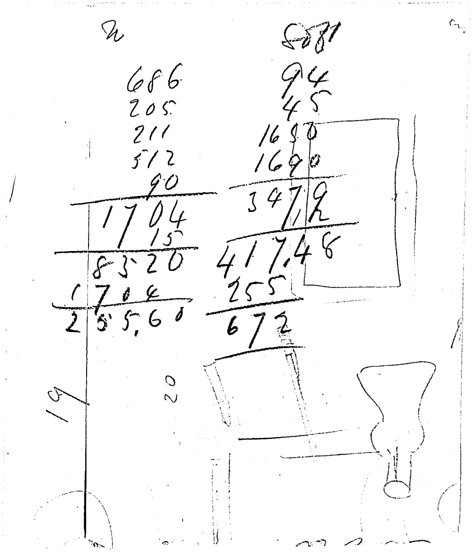


686
205
211
512
90
1704
15
8520
1704
25,560

94
45
1690
1690
3479
12
417,48
255
672

20

19

Notebook, N-87-01-27

This notebook was begun by Edison, probably in January 1887, but it may have been used as early as December 1886. It was possibly used at the lamp factory for notes on squirted filament experiments, nos. 39-142. The pages are unnumbered. Approximately 110 pages have been used.

fils No 39 -

4000 of No 25 + dipi
full dissolve
after got to ingot took over
3/4 hour over flame to get
stiff nuf to squirt die
Stuck a great many times
used little heat on ingot
hard cold but very soft
hot, Towards end squirted
better perhaps I should
not have used heat in
die — fils perfect & glassy
under Micro — moderately
tough, think they will
fuse together in Carbon
dipi almost impossible
to Evap out,

I broke over half by my
knife dropping on them
after putting in Carbon box

'' and 2000 Lamp Blk.
2000 25-1 dipi -

Mealy breaks in pieces in squirting -

Want more 25 & less L blk

fils 40

2000 NO 25

dis in Chloro & little dipi
not good dissolves - mushy
liquid - 1000 Lampblk -
pugged quickly - ingot
squirted as if Lumps in
poor squirter - fils good
under micro, not shiny

Memo No 25 not a good
binder for Lampblack
should have some more
stuff disolved out of it

fil. 41 — 8/1000 dia —

4000 Carbonite well powdered

Chloroform & 8 drops dipi
put together & then poured on Carbonite
pugged very well, didnt put
it in very hard — squirted
fairly well but stuck 2 or 3
times fils shiny fine —

fils 42

2000 Lampblack
2000 XO 33 disolved
in dipi — Takes considerable
time to get it all disolved in
little butter dish by finger

Worked the carbon down in
Mortar till it ceased to be
mushy & got an mixt that
was not very brittle
squirts _perfect_ not a break
6/1000 dia fils good
under micro, not shiny
Very tough, —

fil 43

2000 No 20

2000 No 33 — 33 dis in dipi
takes consid. time to dis by rubbing
took very long time ½ hour in
mortar to gather so could be worked
in fingers to ingot, then took
15 @ 20 min ~~K~~kneading & sheeting
it out while blowing to get
ingot stiff enough — We put
it in press & it squirted so
rough was going to abandon
when finally put on heat, it
then squirted _perfect_, surface
fairly shiny — If this is
good fil think could pug
harder or use less 33.

44 fil.
2000 ~~lampblack~~ Carbonite
2000 No 37 –

ingot only used aldehyde to dissolve, only no depo – couldnt squirt then put heat on got a lot, and in getting 2nd lot heat got too high in press Consequently when I tried put them in Carbon box 1st lot went in ok but 2nd lot all fell pieces – fils under Micro all shrunk due to use of heat & too volatile solvent. [illegible] these fils no good –

Mem

2000 Lampblack

2000 .27 couldnt squirt stuff Compressed to solid just like Marble — No 27 with very little dope is ok but when proper quantity put it it precipitates [illegible]

2000 lampblack
2000 No 27.

Instead of using all dipi used Aldehyde + 10 drops dipi — worked ok

semi mass obtained brittle + mealy character at first broke in small pieces in squirting, then put some heat, went ok then heat got too much waited till it cooled little then came ok squirts only fair — film smooth

No 46

2000 No 20
2000 No 27

27 des in Aldehyde with
12 drops dipi —

Took quite while to get to
an eight [illegible] was brittle
but as it got dryer it became
viscous 4 ok ingot could
be made harder squirted
perfect — no heat I got all
the file — fits smooth
good — Build more — file
tough — when it [illegible]

4/7 feb
No
Zoco 31
Zoco Campbell

No 31 dis in alcohyde
with 12 drops dip'o
pelets - could feel stuff
was sticky - squirted
poor came out the pieces
head made it little
better - possibly No 9
Rough Surface

I' certify it but have
no faith in it —

48 fils

2000 No 31
2000 No 20

aldehyde + 12 drops per dip
for 31 — [illegible] [illegible]
quickly [illegible] gets
vacuum & gas dry

Could be made harder
opaque OK fils have
fine specks embedded
in surface otherwise OK
tough

Wern

28 Cant find
Solvent, probably
one can be found

Hence for this run
28 Mg

49 fils

4000 No 29
2000 Lampblack

found 2000 wouldnt do of 29 so poured that with LBlk & made another 2000 with dope as with first & put that in - pugged quickly — but only pelets not viscous enough for ingot. Wouldnt squirt unless heated when it squirted fine - fils tough but quite rough & bad looking =

50 fil-

2000 No 20
2000 No 29

had used heat [illegible] solvent, film very rough bad – extremely brittle

pbly [illegible]

Mem

Got no good solvent
for No 30 Cant get
filament, [illegible] when
Aldehyde or dipi evap
not sticky will have to
find some solvent

4000 No37

aldehyde + 12 drops dipi all dissolved
long time to get so could
ingot it in hand - worked
it sheety in hand then
got ingot could have been
made very much stiffer,
couldnt squirt except
heated die then perfect
beautiful gloss sticks
little - 8 or 9/1000 dia
should have been pugged
very stiff -

2000 No 4
2000 Lampblack 3

No 4 do in alc poured
on Lampblk in Mortar
Purged to ingot - ingot
not very viscous, very
little tendency stick
to mortar, no heat
squirted fairly well
fils good but very
rough surface —

53

2000 Lampblack
2000 NO Carbonate ?
dis in dip in excess

pugged + put out to dry
worked it to a powder
with big die 9/1000 +
heat hot till ok
Horribly rough - stiff
when came out had bend
over hot glass rod as
didnt bend enough on
finger - squirted good

2000 Lampblack
2000 NO 25—

I missed labels so it may be Carbonate instead 25 but dont think so dissolved in excess dipei— pugged in Mortar till sheety then put in butter dish for hours then repowdered till a perfect powder nearly dry 6@7 dia strong heat perfect squirter but slow as pressure is great. got over 100 could have got more = finest Lampblack fil yet glossy surface shiny metallic looking fils seem free of flaws & perfect end on look metallic like showing great pressure think could have got powder dryer — This is a new departure

2000 Lampblack
2000 No 27

Although only no dope
get to dry powder

With 6/1000 die crinky with 8/1000 squirts OK - breaks occasionally, fraction not so even as 5# & not quite so good surface but better than any previous LBlk. Except 5# - which I will call standard. Then I had to bend over hot glass as too stiff to give bunch of [illegible] at finger used full steam heat, No 56.

2000 Lampblack
2000 No 28.

Aldeheyde only - aldeheyde not very good solvent, no viscosity to the whole affair if it squirts twill be streaky - Dry powder

Ng Cant squirt it No test,

57 –

2000 Lampblack
2000 Rosaniline Hydrochlorat

Aldeheyde only —

Squirts good – 9/1000 dia
very great friction – Extremely
stiff so it only loops over
finger had bend them on hot
glass some fil good shiny
surface others very rough –
tough — for a Lampblk fil

58 Well purified Carbonite
KClo Kind dont puff - lots
ash -

4000 Mg - Mat
with 2 pieces Thymol each
larger than a pea -
worked it down so powder
4 only slightly damp -

Brittle Squirts fair
but fil roughest Ever saw
broke up on finger

No test

59 —

2000 Lampblk
2000 No 5 —

80 drops about [illegible]

Squirts good but very hard

fils stiff had bend over
glass rod — may have got
it too hot or burnt carbon
as I smelled aniline —
fil surface some shiny & fine
but most of them rough
surface due to friction in
die — Got it to dry
powder —

2000 L Black
2000 No 23

in Metal only

No good rough
breaks
No test

4000 No 23 alone

powdered — its damp from H_2SO_4 & water & gum, no solvent used as it softens by heat,

Ng Too Soft —

62

2000 L Black
2000 Sugar in Mol &
Little Water purged to powder
dried in radiator,
Squirt fair breaks very
often but fair Elegant
Try Variations, had to use
highest heat applied for
10 minutes or more - Think
wants more Sugar
Oiled die ⑩ small
part,

63 4000 Carbonite. Mal – 20 dps pugged sheeted + stiff ingot made die sticks somewhat – fils good ⓒ flaws in some but if could be a fine powder it would be good.

After Cbzn all broken – too much charcoal in box – Split longitudinal perfect surface Ox 5 sec Bamboo ox color shrinkage Considerable —

64. 4000 Cbt + chloroform only worked to powder – heat die – squirts fair 2 sizes fils brittle when cold probably be broken in Cbzn – under micro – good.

Broken in Cbzn by too much charcoal ng =

64½ 4000 Cbt 20 dps Isobut in Chloroform 1000 of the 4000 thoroughly disolved though then poured on remaining 3000 Cbt, pugged + ingot worked by hand sheeted over flame + put in mould as ingot rather hard, wldnt sqrt at first

but by warming Die a little & then Cutting
off heat fils splendid, but die stuck
several times on accounts lumps
of those Cld be got out would sqrt
perfect. fils strong - glossy black surface
Easy pugged -

Broken Cbzn by too much charcoal

65 - 4000 Cbt with Isobut I think
Cant say exactly how I did it, it was
an ingot, stiff =
Oxdzs in flame in 2 sec very small fil
surface like glass, no Aylsworth or Cracked
appearance under high power Micro -
all the fils split longitudinally, oxdtn
Carbon - Extra bamboo shiny (1) more
shiny than bamboo ~~after~~ Carbons after
oxdtn., The Carbons were all
stuck together as well as split longitudly
probably if separated would be ok
but too much weight of charcoal.
Evidently Isobut make Cbt tend to
" Melt Easier than dipi

66 4000 Cbt. 40 drops Isobut in
Ether - I have forgotten if this is right
think it is good fils die sticks only
twice,

67. 4000 Cbt Coal tar in Chloroform.
sqrts fine, die stuck twice, fils perfect

After Cbzn stuck together a few fils seperated
from main bunch were ok showing bunch
should be seperated, Oxdtn 2 seconds in
flame shrunk very much surface
shiny but considerable charcoal stuck
to fils, ~~fils~~ not hollow but some
split longitudinally - on oxtn has
about bamboo color -
I say in original account. 4000 Cbt with Coal
Tar dis in benzol & poured over it goes to pieces
as powder, requires great heat & pressure
very difficult sqrt. lumps Cbt pbly trouble
If Cbt was fine ~~&~~ Coal tar boiled down to thick
tar would pbly be ok

68. 4000 Cbt. No 25 + Chloro only
powder - used heat, squirts good,
surface not good - brittle,
After Cbzn all stuck together, Oxtn
= 2 sec, swelled, pbly hollow, oxtn
Color better than bamboo but guess
its ng —

69 - No 20 + Isobut alone used
part + got soft ingot then kneaded dry
20 m - bad surface to fils,
think should have used heat ingot rather
hard
Oxdtn test in flame 15 sec oxtn,
Silver Color, it would be ok if could
prevent sticking - fils were all
stuck together best yet for Oxdtn
Shrinks considerable —

70 3000 No 20. 60 drops Isobut
ingoted it, sheeted, ingot not very
stiff when put in press, squirts bad,
Crinkly - surface rough, used little
heat, went better, too much heat made
bubbles broke fils = fils stretch
length. This stuff may squirt stiffer
After Cbzn fils fair but somewhat
stuck together — Very small fils
oxdtn in flame 7 sec which is good
for so small a flame, strong fil,
very flexible pbly because so small,
Evidently Isobut has a chemical action
which causes Carbon to be carried away
as a gaseous compound, yet it may be
when we consider bulk of No 20 that
this is not so — Surface of fils dark
& not clean, has longitudinal Cracks
dont oxdize down to point but stays
full size & then breaks because there are
spots which ox out, oxtn color
Very silvery shiny —

No 71. 3000 No 20 plenty chloro
20 drops Isobut & 20 drops dipi
when gathered spread the buttery stuff
out in butter dish to dry it came off dish
polished, then pugged till sheety then
let it dry in butter dish till brittle
Then wkd it to powder - fumes coming off;
when put in die, a pinch in finger would
stick together - cld be made dryer had to
use heat, squirted perfect not a stick
surface dark not shiny fils good
Extraordinarily tough, can pull them
through fingers -

After Cbzn These were the only lot that
came out OK. got them all, straight &
good shrunk considerable but still
large fils Oxdtn in flame 10 sec
surface of fils not shiny surface of Ox
is bright not dull or dark but somewhat
shiny, in fact Ox surface is better than
natural outside surface Ox end
irregular, Cavity likes dont go to
point,

No 72 about 3000 Cbt 20 Isobut 18
dipi plenty Ether, brot to a butter & laid
out on dish to dry Dries much slower than
71 — by sheeting & drying finally got
it to powder. used only slight heat,
just sufficient warm die Cbt used
was ground in gasolene floated & filtered
no grit, powder cld have been made
much dryer - squirt perfect not a
break. fils perfect just like glass
fils not tough after drying —

After Cbzn fils broken, stuck together,

73 4000 Cbt 15 Isobut 15cc Ether
no dipi - goes direct to powder finger
cakes it its not perfectly dry 6/1000
die good but cranky 8/1000 sqrts
perfect, fils good, glossy but not
a dead glossy

After Cbzn - Broken stuck

74. 4000 cbt 7 dipi. 15 cc Ether.
goes direct to powder not very
dry when goes in press
(note Evidently use of Ether condenses
water & prevent viscous which may
be bad feature)
Used heat cautiously fils shiny
not flawless some are cranky
8/1000 die sqrts good but slow
dont bend over finger to shape
near enough -

After Cbzn - oxtn 5 sec in breaking
off end shows longitudinal split
surface in places glassy other places
Aylsworth, very little shrinkage
strong in strait pull oxtn color
bamboo shine -

75 - No test,
76 4000 cbt 7 ~~drops~~ Anilin
15 cc Ether sqrts good fils shiny
but too brittle. No test,

77 - 4000 cbt Manufact pea of
Chloral Hydrate 15 cc ether direct to
powder no smell -
After Cbzn = fils large shrinkage
small. oxtn - flame 10 sec
End in glassy - surface fair
just like untreated Aylsworth fil -
no puffs - charcoal dont stick
Considerable ash which fuses
Oxtn color shiny not dull dont
ox to point, irregular

78 4000 cbt, 500 mg Chl Hy 15 cc Ether
went direct to powder, considerable heat
required on press, sqrts perfect
fils perfect, glassy not very
tough bends around fingers
but too large go into Carbon box
Oxtn flame 8 sec very little
shrinkage Hollow in places -
split longitudinally ox color
little brighter than bamboo
fils stuck, broken by charcoal
got a few -

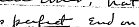
79 – 4000 Cbt about 400 mg say
12 drops Meta Kresol
15 cc Ether, went to powder, no smell
of Ether, fils shiny good, squirts
fine, had bend on glass rod may
have got it too hot This fil dont
puff as much as usual, fils not
very strong used heat in press

After Cbzn stuck together got 1 or 2
too much charcoal broke them
Cld pbly be Cbzd ok –

80 4000 Cbt 12 drops Kresol ortho
15 cc Ether, went direct to powder
heat, sqrts perfect, fils shiny
good, little brittle, dont melt in
flame some crunky
Oxtn 7 sec fils apparently didnt
shrunk at all which is strange
not split, or hollow surface like
Aylsmith fils – Ox color better than
Gamboo, dont go to point hilly
but no cavities fils brake +
stuck together in Cbzn –

81 4000 Cbt 500 mg Bromal Hydrate
15 cc Ether direct to powder no
smell Ether, hot die sqrted perfect
fils perfect End on absolute perfection
but when I bent them over glass
rod broke No test,

82 4000 Cbt, 500 mg Bromal Hydrate
15 cc Ether, got get die very hot,
otherwise fils break + you must
squirt very fast so gets in finger
before cooling otherwise the bend is too
big + breaks – under micro they
show puffs pbly press too hot,
After Cbzn – Large fils dont appear
to shrunk at all – Ox in flame
7 sec under micro found it
all cracked – surface perfect
Cracks are at right angles to fil.



Ox Cbn black not silvery shiny
but Gamboo shiny

83– 4000 Cbt, 300 mg Betol
(Naphtalol) 15 cc Ether.
Squirts fine, heat, brittle towards last
got few – had bend over glass rod
& some broke there fils file like
surface on most, not very good
fils – ~~[illegible]~~
After Cbzn all broken, stuck
together but probably could be made
to work –
Ox in flame 8 sec no apparent
shrinkage not hollow or split,
surface shows streaks of die
Much better than Ay [illegible] fils
Some fils rough but others have
above surface Ox color better
than Bamboo –

84 4000 Cbt 300 mg Menthol
15 cc Ether, rough ng no test,

85 4000 Cbt 500 mg Trichlorophenol
15 cc Ether, Brittle
ng no test

86– 3000 Blood albumen blackened by
action hot H_2SO_4 fuming plenty
Mal-& 30 drops dipi – got to
squirt but tough Cldnt squeeze with
fingers picked it to pieces & dried in
dish 1/2 hour then repugged got it
so could just squeeze it showing
that it was soft. forced it in
press in chunks fils fine & very
tough, dont puff when put right
in flame squirts crinky otherwise
good it had lumps in it or it
would squirt perfect,

After Cbzn Brittle, all broken, by too
much charcoal.

87 3000 Cbt, plenty Ether, about 750 mg
Chloral Hydrate pugs to squirt
very Kneedy could use half the
amount, I sheet it & dry on
dish; it gets dryer the Chlty Evaps
bulk is very small, got too much
heat & pbly too much Chlty lumpy
got only few fils –

after Cbzn OX 2 sec self oxides
after withdrawal fm flame
surface perfect glass Hollow
Oxdn Color Silver
fils all broken stuck together
too much charcoal in box
cand be made to work

88 3000 Cbt 20 drops dipi
plenty Ether 300 mg Chetty
floated burnt lime but guess
its so old its all Carb Lime
had trouble first cranking but by
heated new Die got fils
nice — no stick after changing
Die — fils good not shiny
in flame Lime stays behind
+ goes to very high temp
after Cbzn NG brittle all
broken —

+ 89 —
No 90 3000 Cbt, 20 drops dipi
abt 300 mg Chetty + Ether,
Alumina OX is in one magnesia OX
in other Cant say which one
powder — squirts fair —

No 90 — after Cbzn — Carbon OX
out in 10 sec oxide is left much
diminished in size cant
break in flame surface fair
particle sticking out cant
say if its charcoal or not
there are puff spots

but full — when slightly oxdzd in
flame Oxide makes a nice white
Coating apparently not very
porous — OX is evidently not
reduced by Carbon fils
strong lengthwise, brittle in
bending —

I go back & make some test on fil
Carbzd which have shew good life =

No 22 2000 Lampblack 2000
No 5 — Little more shiny than 54
has a glaze to surface as if
on points Ox in 10 sec
Ox to point, Color poor bamboo

No 43 2000 No 20 2000 No 33
~~33 ...~~ ox 5 sec soft oxdzble
spots dont go to point, puffed
badly Ox color very shiny.

No 8. Ox 5 sec ox color shiny
but not so shiny as 43.
goes to point but all is horrible
rough & pieces unoxidzed stick
out, shows pieces silica also
ash Surface of fils not so
good as aylsmith fil -

Aylsworth fils untreated
Ox in flame 75 seconds
Surface of fil far more glassy
than aylsworth treated or untreated

46 — Ox in flame 8 sec
Ox color silvery about same
as 43 — all puffed & worse
than 43 general color of
fils not so glassy as 43
~~some~~ great cavities ox out.
if end be got solid would be
ok sure

54 — Ox 8 sec Color Lampblack
Ox to point. Surface of fils
about same as untreated
alysworth after they have
been oxdzd in surface
think this Carbon might give
fine results for flashing

No 92 -

2000 Induline No 33 2000 No 20 ammoniated by ammonia water then Methyl alcohol -

dissolved 33 or Induline in 60 drops dipi - pugged to sheet, then dried & worked to powder - fils rough surface End on like lampblack Carbon, with only moderate heat friction drag on die made horrible surface: with more heat got less hence surface rough like Lampblack Carbon, dont bend to Curve of finger but little bigger. fils quite strong - Used small amount of charcoal over fils in Clay box

After C fils has preserved original rough unshiny surface most of fils have die crax fils good round End on shiny but spongy Center

No 93 – Same as No 92 has more
Charcoal over fils in Cbz box,

Cef Cu Cbu

Shows Evidence puffs
Very poor surface spotted
bad plbg ng —

No 94 Is attempted duplicate of 43
Used 2000 old No 20 that old 43 was
made with 2000 No 33 disolved in
dipi – not all of it was disolved – after
disolving in small mortar, poured it on
No 20 + pugged till got ingot, then
sheeted it. Sheet, hadnt a good surface
dried sheet in flame, then dried it in
dish then put in mortar + got to
powder, worked powder for say 10 minutes
dipi smell not very strong,
fils came with bad surface till got
plenty heat then came nice fils with
a lampblack surface probably about
like No 54 or 42. fils is bronze color
somewhat tough loops over finger
3" radius had use hot glass rod –
No other liquid but Dipi used

I find I have 2 No 94 $

fils all cracked got none
pieces show shrunk + cracked
Very silvery —
– note dont know which 94 this

Second No 94 Is duplicate of 43 but
we got too much heat on die it
was good but we let heat stay too
long so it made very irregular warty
surface No 20 stiff was same
made with very little HCl over and
above what was necessary for
Combining with the Aniline Oil.
its water sol- didnt wash very
good + used no alcohol
used Equivalent amounts of
No 33 in dip — no other liquid
Can see that if we hadnt used
too much heat it would have
been OK pbly all the No 20's
will work = Cant say if above
was put in box or not,

No 95 2000 No 33 ~~[illegible]~~ 1000 No 20
80 drops dipi only liquid used
all 33 disolved but about 1/2 pea size — took 20 min
to disolve + 20 more minutes to get it to a summer
butter consistency put it in butter dish to dry out
Takes 4 or 5 hours on butter dish before its dry
enough to work into ingot, it sheets well
poor surface to sheet, but can get sheet
big as your hand, sheet tough, dried it
to powder in mortar in 5 minutes after I got
it to powder put it in press, had
trouble I quit it cranked etc, but it was
always good, round fil no puffs —
used moderate heat The ones put in
C big box was a few that didnt crinkle
surface is about same as 54, fully as
good — not shiny, fils even, ends shiny
but not glossy
Remark think this wld squirt easy if the
die had a straight part or the stuff was
either dryer or wetter, a variation either
way is necessary as the Crinkling
Comes in, if Crinkling cld be stopped
fils would be ok — H
After C
Much better surface than 96 not as
good as 43 better than 54 shiny but not
clear shiny no puffs fils perfect

A

No 96 - 2000 No 33 2000 No 20.

80 drops dipi put 33 in dipi gradually grinding all the time, got it all disolved perhaps few fine clots went in, should be strained No. 20 was previously powdered in Mortar, worked it in mortar only to a liquid like Molasses & then put it out on a dish to dry at 3.28 pm. powdered at 11 am the next day, there was still some sticky lumps in it, when sent to press strong smell dipi — for 1st 2 feet silvery shiny fil, had considerable heat on then it went bad surface (ie) good fils but bad surface owing to friction on die, took heat off but fils only got a little better, looks just like a Lampblack fil & I can see drag Cracks in places had bend them over hot glass rod.

After C

preserving original L Blk

Surface nice shaft no puff

End on mealy. spongy all through

B

No 97 2000 No 20 2000 No 33.
80 drops dipi worked same as 96
put in dish at 355 pm. worked to powder at
1 pm next day took over hour in
grinding + blowing to get it apparently
dry but still dipi smell came off
used heat + when finished fils freddy
took off die + you could see steam
coming out, it smelled like dipi —
fils are good but have no sign of shine
look like cement fils end on shows
lots holes showing puffing — fils are
also much larger than die,
dont think they will have shiny
surface first foot came out
perfect like silver, think we used
too much heat,

After C
fils perfect, think very little
shrinkage — no shine — Lumpy
surface no puff End on
porous

No 98 — 2660 No 20 1330 No 33
60 drops dipi put to dry at 8pm —
it dried in lumps & I powdered it
next day when in powder it was
strongly damp with dipi &
added 10 drops dipi direct to
powder made ingot, not very
stiff in one hour after ingot
made squirted it, had few lumps
but squirts good, one batch fils
OK others not so good, fils
round, even, surface poor lampblack
surface but even, end on dull not
good

After C
fils perfect, no puff or Colapse
not shiny Lampblacky surface
not very silver like - shrunk some
much more than 97 ~~[illegible]~~.

No 99 2000 No 20 2000 No 33

33 put right into about 200 drops Chloroform it clots to one clot, I then got the clot down so apparently no lumps in it the clot was immersed in Chloroform slightly then poured the 2000 No 20 right in & pugged. I should have previously ground No 20 but didnt, it has lumps, got it gathered to ingot & worked in finger, put it in press quite soft with Chloro smell strong Could have wkd it much harder fils good, round, even but Lampblacky surface; they didnt get shiny on heating on sandbath, as dipd ingot fils do —

after Cbzn
fils good, ruff surface not glossy End in outer Edge of Center holes

Sep good —

100 — Duplicate of 43

2000 No 33 2000 No 20 100 drops dipi — dissolved 33 in dipi & filtered it through muslin on to No 20 which was previously powdered, got ingot, sheeted & dried it & got to not very stiff ingot, used very little heat on Die only no steam — if too much heat puffs if not enough rough surface about 150 deg fahr best Squirts perfect no stop or sticking of Die

fels Lampblacklike surface

After C

Not perfectly round surface rough not very silvery

End on shiny sometime puff here I think —

Dup 43 - Variation

No 101 2500 No 33 2000 No 20
125 drops dipi - 33 dissolved in dipi
+ filtered through muslin on to
No 20, ingot rather soft, takes
long time to get it to ingot by
wkg in mortar + then sheeting
fils fairly shiny little better
than ~~[illegible]~~ Lampblack;
29 points perfect, very little heat
on die part fils shiny part
rough surface

101 - good fils shrinkage consid
no puff surface rough but
solid End on holes, shiny -

No 102 No 20 2000 No 33 2000
about 90 drops
Benzaldeheyde — make thick
syrupy liquid with 33 in it,
if all dissolved cant say
got it to thin butter & put
it on dish to dry dried
3 days then was soft
enough for ingot squirts badly
slops now & then
after [illegible]
files good but rough surface
file rasp on them

Dup 43 - Variation

103 & 103 A Both the same

3000 No 33 2000 No 20 150 drops
dipi - solution of 33 in dipi filtered
through muslin took over 2 hours
to put to ingot. sheeted it for 1/2 hour
& then got it so dry no sheeting
could scarcely ingot it, but
by holding over flame it soften
so I ingoted it OK. ingot
when warm only fairly hard
could be made harder &
fils good. Lampblack surface
squirts perfect only slight
heat in die no steam, dont
go above 150 Fahr. 100 101 & 102
& these are all squirted with
small die —

after Cbzn

Shrunk - shows tendency puff
in very small little puffs.
surface rough not shiny
End are shiny but some puff
holes in Center.

No 104 —

2666 No 20 1333 No 33

80 drops dipi — 33 in dipi filtered, fairly stiff ingot it squirt fair but you must have heat right on die otherwise surface worse than lampblack its probable there was not enough of 33 but possibly fils would have been better if ingot not so stiff as it dont puff when showed right into flame

After [illegible]

Bad surface not silvery think see cracks End on apparently no holes

No 105 — 3000 No 33 1000 No 20

150 drops dipi – 33 disolved in dipi solution filtered, after mixing well in Big Mortar to molasses like liquid twas dipped out by spoon & put in butter dish to dry on radiator at 10 am —

at 6 pm took it off radiator, part was solid part liquid wked it in mortar for 1/2 hour got ingot worked it little by sheeting for 5 minutes – left it in form of ball & went to supper at 730 pm sheeted it so it was fairly stiff cold; squirts perfect no break, fils lampblack surface pbly not quite so good small die used. used very little heat on die no steam great deal of dipi still coming off fils melt when ~~put into flame~~ when thrown on hot dish just after sqrtg dried fils in air 3 hours before putting in box fear these fils will puff or melt in Cbzg —

after Cbzn sq fils shrunk irregular some puffs fils bad Cbzd without sticking showed say 1/9 shrink in size considerable End are not round shiny but not perfect think some fine air holes —

41

106 – 2000 No 27 2000 No 20
100 drops dipi in which 27 dissolved, clots together and takes a very long time to dissolve by grinding dissolve is fair only after pugging I concluded from the looks it wouldnt make an ingot, so put in 20 drops Isobutylamine got ingot ~~rol~~ sheeted it, its rubber like due to action Isobutan 20, can scarcely sheet its so tough ~~&~~ Rubbery put it on dish to dry dried several hours
Dried fils 3 hours before putting in Cbg box

after C –
perfect fil silver surface but rough lampblacky had it a mirror surface would be fine – no shrink – cracks or puffs

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106 seems missing ok

No 167 2000 No 20 1800 No 33
80 drops aniline oil – apparently dissolves it it was clear & syrupy put it on dish to dry –
after 3 days drying + 1 day on radiator stuff scrambled up some pieces brittle dry, others viscous succeeded in getting whole to powder, semi viscous with slight heat on die only – squirts good except die slips every few fils by specs in it, pbly the dry pieces; fils good large die – surface Lampblack like but good on throwing fils on hot dish puffs little, bals gets glare on tough fils can stretch them; Dried fils 3 hours before putting in Cbzq box.
after C
Shows slight puffs no shine rough surface

2000 No 27 2000 No 20

100 drops dipi with 27. Clots together & takes long very long time grinding to get it to dissolve dissolve is fair only pbly good deal in suspension after pugging Concluded from the Looks that it wouldnt make an ingot so put in 20 drops Isobut got ingot & sheeted it, its rubber like. due pbly to action Isobut on No 20 hence can scarcely sheet, Elastic instead of Malleable put it out in dish to dry Dried 3 hours Dried fils 3 hours before put in cay

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2000 No 27 2000 No 20

100 drops acetone,

dissolves without clogging filters well, but goes to mushy ingot put in 10 drops Aniline oil didnt do much good ingot mushy but still an ingot cant sheet it only a little put out Dry on dish Solvents of 27 dont appear make it sticky at the End of operation.—

27 is pbly a base combined with an acid & if decomposed ~~[illegible]~~ the base might work

NG — but when cold it squirts very slowly under great pressure — most glassy perfect fils yet but heat spoils it with press arranged to get more pressure they could be squirted — got a few fils but spoilt them bending over glass & put straight sides in any way to see how they CB

after C—ro— surface fairly fair not silvery

No test-

2000 No 27 2000 No 20 175 drops Wood alcohol.

found on filtering the 27 mal did not all went through washed filter with more W al & put all in mortar on pugging to nugat found it mealy - put in 8 drops aniline oil but this didnt help it much then put in 12 drops Isobut this made nugat more viscous but its sticky & somewhat mealy so cant sheet it only little | I now dry it on dish

N9 - I didnt get it dry enough had I done so could have got very extensible sheet very tough & would have squirted ~~off~~ fine

No Test,

3000 No 20 1000 No 27
125 drops Mal.
Went to powder no way at
Keeps wet long time
put in dish to dry
Ng Cant squirt,

2000 No 20 2000 No 33 150
drops Mal — Mal didnt disolve
all of 33 large clot in mall,
I saw cldnt disolve so poured
into big mortar & dumped 20 in
pounded, Dried Ng rough
terrible heat to get it
squirt at all —

2000 No 20 Treated with ammonia
water, strong, then washed mal
1000 No 33 — 50 drops dipi
Ng no test

2000 No 20
1000 No 33 50 drops dipi
Came quickly to mush put
out dish to dry —
Ng. —

2000 No 20
500 mg No 33 — 50 drops
dipi — goes qkly to butter
set out dry fils too rough
got some filaments that were
good but didnt polish
in hot butter dish —

2000 No 20
300 mg No 33   45 drops Dipi
85 @ 90 % 33 dis — comes quickly
to ingot put in dish to dry —
got to powder fairly dry
3" inches of fil plating
When very hot Dire spots ~~grit~~
ng —

Phenalakin — in spoon melts &
80% sublimes There is left behind
a tar which has enormous
Viscosity the Carbon from which
is absolutely perfect glass
& mirror like — even under high
power micro absolutely
perfect. nothing heretofore
seen comes anywhere near it
if this tar is soluble
could be mixed with
20 or used as a dip —

Salvents for No27.
Chloroform ng
Alcohol OK
dipi only fair clots it
CP Aldeheyde only partially salvent
Acetone treated NH4 good.
Ether ng
Butylchloral ng
Aniline good
Acetone alone good
Ethyl Al good
Water only little
Ammonia water only little
Acetal only fair
Camphor Carbolic seems be good
Benzaldeheyde pretty good
Benzol ng
IsoButylamine Curious dissolves
perfect, appears bleach it
a little try a little with
other Salvents
Cumene ng
Mirbane ng
Ortho Kresol apparently good

No 109   4000 Carbonite .5 drops
Ortho-Kresol in Ether, works to
powder. fils perfect. Some puffed
die got too warm— fils very
brittle, sqrts perfect, afraid
will puff in C69 —

After C

Shine perfection but in
shrinking surface Colapsed & crckd
if old 6 | Cbzd would be perfect
no puff— brittle Cant seperate.

No 110 – 2000 No 20 2000
Carbonite gasolene process.
100 dps Dipi Cbt dissolved in dipi
filtered, ingot sheeted over
flame got it not extra stiff
when hot but pretty stiff when
cold — squirts without heat but
surface bad + cranky put little
heat on abt 150° squirted perfect
fils look exactly like Lampblk fil
surface not quite so good
fils even + perfect rather tough
dont melt in flame Color fils
dead black. no sign of shine
Dried fils 3 hours before putting
in Cbzn box, small die

after Cbzn –

Dont seem be rough think there
is a Collapse effect surface
rough not silvery Ends
shiny but puff holes

No 112 missing

No 113 2500 No 33 2000 No 20

150 drops dipi – filtered dipi 33
Solution, used little heat on die
only squirts perfect, fils very
rough 3X10 sqr die the
roughness over round die is prob
due to want polish in sqr die

After Cbzn

fils perfect – sqr fils 3X10
no Cracks or puffs surface
rough but Color silver most
silvery yet. End in doubt but
apparently not perfect
no holes

No 114 4000 Carbonite, 6 drops
Ortho Kresol in Ether; Puge to
powder Ether smell all gone when
put in die. Spots perfect, 3x10
squeeze die used little heat
felts perfect surface perfect
shape, not tough but handled
easily without breaking

After C

Colapsed inwardly Cracked
shell, shine good,

Another report
says 3 of felts shrunk
irregularly under skin
Colapsed —

NO110 — 2000 NO20 2000 Carbonite
gasolene process 100 drops
dipi Carbonite disolved in dipi
filtered sol, got ingot, sheeted
over flame got it not extra stiff
when hot but pretty stiff when
Cold squirts without heat but
surface bad & fils Cranky
put little heat on die say 150 Fahr
then squirts perfect fils look
exactly like lampblack fils
surface not quite so good fils
Even + perfect, rather tough
dont melt in flame Color of
fils dead black no sign of
shine Dried fils 3 hours
before putting in Clg box —
small die —

No 111 2000 No 33 2000 Carbonite
100 drops dipi — No 33 dissolved in
dipi & filtered, pugged to ingot
put out dry 2 hours then pugged
by hand ~~then~~ sheeted over flame
when it is so tough cant be sheeted
Cold it soften very much in
flame got ~~it~~ stiff ingot
~~over~~ flame, brittle when
Cold used about 150 deg Fahr
on die only squirt, perfect,
fils shiny not Lampblacky
think they will crack open
Dried fils 3 hours, End on
full air or puff holes but fils
are fine & perfect in shape.

Afls in C
Nice round — all good surface
shiny but not dead smooth
to give mirror no pufs
Ends on shiny full holes

Salvents for Induline free arsenic No 33 —

Ether ng —
Aldehyde Conc fair dries slow not sticky —
Light aldehyde I think is good Salvent
runs to center dish dries slow
Dipi first class dries fast not sticky
Mal good —

Isobutylamine 1st class turns it red, Little sticky, surface dull —
Aniline Oil Com'l 1st class think it better than Dipi
Trichloroacetic acid good —
Camphor Carbolic good
Chloroform fair not sticky, dried surface not shiny
Oil Hemlock dont dissolve
Hypnon fair dont stick
Butylchloral good solvent surface dull but somewhat sticky, something in it try —
Cuminic acid fair dont dry
Paraaldehyde ng
Aceton treated with ammonia gas perfect sticky
Acetone alone 1st Class
Benzaldehyde perfect, not sticky but may be when thick

Notes - Platina Spoon melts -
Tar of Sagapenum good about 1/4 goes to Carbon full white ash. Gutta P smell.

Gum Ephobeum 1/4 residue good Carbon. ~~but~~ full white ash, GuttaP smell

Gum Olibanum ng

Gum Gambooge fine Carbon - 60% residue very little ash, Melts with great difficulty wl'd Cbz ok very viscous pharos if go quick -

Gum Aloes 1/2 residue very viscous even when go slow it pharos - Carbon good, but considerable ash might answer if coned got ash down -

~~soft~~ Mexican asphalt, 1/2 residue Considerable ash Lumpy form Carbon strongy but fair

Gum Kino just perceptibly soften practically Carbonyze W.M. its a Lime Compound 1/2 or more is Lime -

Gelatine puffs then melts then contracts to solid Carbon but lots Lime -

Catchen - D.W.M. Lime salt -

Gum Gurac melts 1/2 residue Carbon not very good some Lime in it.

See No. 124
Therefore Thurs. was
Jan 27th (1887)
F.R.S.

No 116 4000 No 42 4000 No 33

42 had some fibre in it from filter paper so put it thro Bolting cloth. 33 dis in 325 drops dipt well dis + filtered thro one Thickness filter paper clear solution poured on 42 in large agate mortar + ground for little while + then whole put in saucer over radiator till it got syrupy then transferred it to Mortar + pugged by blowing until got little stiff — divided it in two parts one part was sheeted + dried + run through rolls until I couldnt sheet it with fingers — Divided this in two parts I will call one of these parts No 1 which will be the softest [illegible] — when cold No 1 quite stiff — without heat on die requires great pressure fine good fils but no shine, more perfect than LB — When die gets warm shine is perfect, am in doubt if there is any puff to fils under Micro appears have uneven places in diameter I No these fils 116 put in paper boxes. Thursday 26th I think Thursday anyway

No 117 No2 part. couldnt work it by sheeting but could sheet it fairly well over flame. wkd it until could scarcely sheet it over flame ingot solid when cold—

When die little warm or hotter than No1 ingot shine fine but not so fine as No1 I notice there is not many bad spots in it but I notice some of pits larger than others, think it will be necessary to heat dies only & accurately to a definite temp

No2 is 117

118 No 3 put as 118 got a little harder by sheeting over flame than No 2 — when heat on die is moderate pits are perfect but have beautiful Lampblacky surface no shine, but as heat increases shine comes on, shine very glossy & mirror but I notice some pits larger than others also some spots larger than others showing that when you get the Mirror there is puffing hence it will be necessary to have less heat & get the Lampblacky surface which will polish shine on Cbyw as 43 did

119 No 4 part of ingot 119

Got it to powder, rather dry still
it would show pestle streaks
in mortar showing a stickiness
although apparently rather
dry. [illegible] small weak
put powder in with regular heat on.
die wouldn't squirt had got die very
hot then it squirted OK fine shiny surface
but not so shiny as 1 2 & 3 but it
Crinkled badly the hotter it gets
the less the crinkle don't think there
is as much puff as with 2 & 3
but crinkles are bad if powder had
not been so dry it might have been
better. think No 3 is best
with well & even regulated heat
Evidently there are lumps in 1 2 & 3
which shows in going thro die
they produce a bend also show themselves
embedded Evidently Manipulation of
ingot must be so as to stop this, rolls are
ng stuff [illegible] 119 comes out stiff
Curled in finger too large. Must be
bent over glass rod

120 5000 No 42 3000 No 33

225 drops dipi 33 dis in dipi & filtered
through filter paper only about 3/4 I think
went thro filter hence there is less than above
proportion, 42 works nicely in dipi a considerable
portion dissolves thus liberating insoluble pp
finely divided, The stuff dissolved out by
Ether, Chloro, & Benzol melts & gives mirror
Carbon, - very considerable amount of the yellow
sublimate comes off if this could be carbonized
or seperated it would be good, its as
thick in Cbzq 42 in apour the whole turns
yellow under micro this is due to coating
of yellow needles of a sublimate, it soon goes
off -

I - divide the ingot obtained by pugging
& sheeting above, into 4 parts.
Part 1 or 120 is ingot which was
little harder to sheet than 116
The 42 having lot of filter paper fibre in it
was ground & sieved thro bolting cloth,
No 120 squirts good without heat,
surface better than Lampblack but
with heat surface shiny but not as
good as 116 its a cross bet LB & mirror
sizes of fil pretty even little crinky had a
little heat on to give shine dont appear to

to be any puff & they seem even in size

No 2 part or 121 got it only little harder shine about same as 120 fils fairly even dont think there is any puff still there is crinks now & then & spots, Extra 42 over Equal 42 makes friction on Die greater & perfection of surface diminishes as 42 increase

No3 part of ingot, 122

I got as hard as could by checking over flame still it dont seem as hard as got corresponding 118 perhaps due to nature of the stuff.

4th part of ingot 123

Was sheeted pretty dry + put on butter dish with another butter dish over it & left to dry all night — in morning powdered plenty dope came off but still it appeared pretty dry probability is that individually particles had plenty dope inside — Requires die very hot can scarcely hold finger on it 1st Lot fils very crinky but apparently good not puffed, brittle, will have to bend over glass rod 2nd Lot has die hotter but it came out puffed, fearfully brittle got none, dont think No 4 is practical to squirt without something could be changed in press to get pressure closer to die & die itself heated only by copper rod

Mem

on 1st attempt quick [illegible] on Little prelim —
116 badly shrunk. 117 shrunk + puff
118. ~~[illegible]~~ no crinkled shrunk but
puffed — 119 no puff but fear not good
No 120 shrunk 121 fair but puffs
No 122 good with slight puffs
123 puffs no whole not good —

Saturday 29 Jany [illegible]

124 Took 5000 New 42 having no
filter film — but which does not seem to be
as sticky by dips as old 42
powdered it in Mortar + wet + ground it with 100
drops dips then 3000 No 33 dis in 200
drops dips filtered through 1 thickness
filter paper. about 1/2 went thro + then it
went so slow I poured it out of
filter into 42 ground all + got [illegible]
Cut it in two 1/2 will work Monday
other 1/2 just squirted 1st part of
2nd 1/2 is 124 got most made the
dry used Copper rod heater on
die only, film good, better than lately
a semi shine squirts good
Dont think there is any puff —

125 is 2nd part of last 1/2
it was little harder than 124
Segments OK think surface is even
better than 124, but surface isnt
much better than old 54. It had
a semi shine but laminating films
seem fairly even + show no
evidence of puff - think Copper
Rod heater is a success.

130- Stand long time
in flame but broken
no film - possibly with
Naphthalin cld be
used to wk etc
with plenty Lime

New Series -
Start 130 -

3 grams gasolene Carborite.
500 Mg Chloralhy. about
1/4 Sqr inch thick mushy
Hydrate Lime - used about
Ten drops dipi in which I
put the Lime, then put
whole of Cbt in ground +
finding it not very sticky
or shiny put in 15
drops dipi Extra
became viscous Shiny +

stiff to work – ingot quite
soft – The Chloral was
ground in Lime & dipt
dont Know if it dissolved
or not, no heat on die
squirts OK, fils shiny
but there is a lumpy
appearance at places
put right in flame puffs
only little Oxidizes &
Leave Lime = 5 squirts
without a stop 8/1000
die =

NO 131 No 2

3000 gasolened Cbt,
1 gram ChlHydrate in just enough Mal to wet powder.

Worked in Mortar till powder dry and Chloral smell predominates —

.005 die — use copper disk and heat jets —

Squirts perfect 500 feet without a ~~flaw~~ stop.

fil measures 5 3/4/1000

There are Kinks, fils beautiful shine
go over finger ok tender when dry

fils all Colapsed after Carbn

132 fils fine - tough

not self oxdy - 6@8 sec in flame - magnesia is reddish pbly colored with gran fils on oxdtn not free of flaws - not so good as 136 for evenness

No1 Moved

132

3000 Cbt

1000 ChlHy

The alcohol Mal being saturated with acetate Magnesia by boiling one minute, worked to dry powder - powder darker than when no magnesia in Mal, Squirts perfect fils glossy but flaws in either because I didnt use enough Mal or didnt mix it good or turned heat off too soon when it got running ok = fils show in flame plenty Magnesia —

3000 Cbf
1000 Chl Hg
1/4 inch stick potash,

Dry powder—

Can't squirt it although powder was dry the heat makes KO Combine with Cbf to produce an alc-alcoholate—

~~No test~~

Same as above with Bromide Lime Hg—
Water

all stuck
together - full flaws besides

No 7

133 -
3000 Carbonate
1000 Ch Hyd
500 mg Salicylate Calcium

Sil Ca dis mal perfect, not deliquescent,

Mixers hard, as it seems to have solvent action of Cbt. powder is balky

Squirts when properly hot absolutely perfect, when not enough heat Kinky it stands a surprising amount of heat without puffing in the least,

3000 C6f
1000 ChlHy
1 1/2 grams Salicylate Calcium
in mall -
Couldnt get it to powder
only a soft ingot,
Couldnt get ingot off.
squirted peglet out
Little Lumpy & it was
tough & sticky film stuck
together Either SaliCa
prevents HyChl from
Evaporating or Else it
is a solvent itself -

No test,

134

3000 Cbt.
1 gram Salicylate Calcium
Mal—
No Chetty—

Dry powder - with heat
fils shiny. but puffed
when very little heat
fils not shiny but very
smooth lampblacky
but perfect.
Shows it has solvent
action. pbly 250 mlgm
Chetty make it ok
puff w/ flame not great.
fragile filament,

All broken up when
put in mould

3000 Ckt
Saturated Soln Ethyl of
Aniline Roth Fuchsin
The amount of Solution about
same as used in previous
film —
Didn't get it dry
Enough wet with alcohol
Couldn't get any film
No Good

Original 7/1000 of Cu.
CB 4 1/4/1000 –
fils not so good as
136 –

Possible that as we increase
Napthalene size will
diminish + get more
dense —

135 = NO 3

3000 Cbf
about 1/2 grm Napthalene
Gasalene —
With great heat it was
a long time before anything
came seems if it was going
be a failure finally it
came fils OK but not
shiny wants more Napthalin
don't puff much in flame –

fils all broke at curve
before putting in box

~~B~~ No 4
45 =

136 =

3000 CBt

1 gram Napthalene in gasalene & not all dissolved say 7/8 dissolved - had use considerably more gasolene than necessary wet Carbonate ground it well got to dry powder, & put powder on paper & held over flame till no gasalene smell. Took very strong heat, jets nearly touching before squirted, then by squeezing fast squirted perfect fils shiny no puff Ended on - in open raw, fils do not puff but little oxide slow showing great density - This is most favorable of all the fils so far — The fil smells I think coming out Die =

136 - oxidizes to a thread nearly
perfect but not quite perfect for small
cavities 1/2/1000 in it - also fine wave
occasionally as fresh melted -

Its self oxidizing showing that
its porous I noticed that it
had contracted least of all
This may be good their being no
cleavage don't seem to be any
air bubble cavities -
all Carbons came out good
but around bend some are
bad as I puffed them by
using rod to hot,
The fils are shiny & will
Carbonize I think without
Charcoal to beautiful surface
Alltogether this is best fil
in the lot,

Original fil 7/1000 Cbzd 4/1000

137.
3000 Carbut
1000 ~~P~~ Diphenylamin
in Mal - when poured on
Cbt. it combined & made a
stiff viscous sheet
precipitating from Mal - I
poured off ~~all~~ mal Cound
then pugged to dry powder
used considerable heat
& quite perfect but although
shiny fil there are
not perfect, spotty
fils stiff - They puff great
deal in flame -

138 N°10

3000 Cbt
1000 Trichlorophenol Mal

gets viscous sheet pp in Mal
like 137 - Left Mal in +
plugged & boiled till dry
powder squirts perfect
considerable heat,
fils more shiny & better
than 137 - No puff
End on but they
seem large possibly dia
has got larger but think
its expansion due to heat
puffs much in flame -

139- No 11

3000 CbT
1000 Benzoic acid mol.

Goes to powder— requires very little heat, squirts perfect fils shiny but imperfect. Warty puffs badly pbly ng—

3000 Cbf
1000 Resorcin
Mal—

Squirts perfect film perfect. no puff - very small heat. Think it will puff in Cavity. I am going to make one. (500 milgm Resorcin - got above to dry powder film tough - friction of powder in mortar great until dry -

3000 CKt
500 mg Resorcin mual,

When get enough heat to make fils good & blury it puffs & fils mg when colder so dont puff fils mg —

Mg Notest

3000 Carbon

Saturated Mol Sol Fuchsine Red)
about same quantity as Mol
used when dissolving
pugged to powder then
with new lot Mol &
500 mg Naphthalamine
repugged to powder —

It will [illegible]

3000 Cbt
1000 Terotodin in meal.
The Cbt got viscous sheet in
meal & then poured off brine
& plugged the dry powder it
puffs terribly on spoon before
igniting —
Squirts [illegible]
[illegible]
[illegible]
Ng

3000 Cbt
1000 Acetamide Mal.
dry powder - swells some
on spoon it

No good) Can't squirt all
Water)

3000 Cbt
500 mg Bromacil Hy[illegible]
squirts fair but want
1 gram.

141 - 1013

3000 Ckt

1 grm Salol. (Salicylate of Phenol)

Mel -

powder - Squirts perfect
no checks fills perfectly shiny
straight even no puff due to
heat on Die fill small -
5/1000 Die -

142 No 14

3000 Cbf

1000 Diphenyl Methane

Ether - as Mac did it

squirts fine - fairly

shiny cheeks in film

films not puffed out

Even - some of films got

more shine than others

on account variation

heat must get rather

hot die —

Notebook, N-87-03-00

This undated notebook is a continuation of N-87-01-27. It was used by Edison for notes on squirted filament experiments, nos. 143-166. Also included are several lists of chemicals, which precede and are possibly related to the filament experiments. The pages are unnumbered, and the book has been used in both directions. Approximately 105 pages have been used.

CHLORIDES

Cobalt –
Cuprous chl –
Tin — chl
Manganese chl
Napthalamine chl
Aniline Hydrochloride
Potassium
Sodium chl
Nickel chl
Barium chl cryst
Tin protochl
Ammonium chl
Chl. Lime

Calcium chloride

Chromium Sesquichloride

Nickel chl —

Copper chl —

Cal chl fused

Manganese chl

Oxides

Fe Sesquiox
Cobalt
Barium Hydroxide
Bismuth Ox
Stibium Ox
~~An~~ Antimonic acid
~~B~~ Aluminium Ox
Litharge - Pb ox
Peroxide Lead
Silver ox
Cadmium ox
Ferric ox
Chromium ox

Blue of Cobalt,

Nickel Ox

Cobalt Ox

Tin Ox

Bismuth Ox

Nitrates

Potassium

Sodium

Nitrite Potash

Magnesium Nitrate

Mercury Nitrate

Lead "

Aluminum "

Bismuth Sub nit

Zinc nitrate

Barium "

Bismuth nitrate Cryst

Ammonium "

Sodium "

Cadmium "

Potassium

Cobalt

Calcium

Urea cryst.

Sulphate

Sulphur

Barium
Ammonium
Magnesium
Bisulpotash
Sodium Bisulph
~~B~~ Manganese Sulph
Alumina Sulphate
~~Alum~~ Sodium Bisulphite
Sulphate Iron
Potash Sulphate
Barium "
Magnesium "

Sulphates.

Bismuth "
Cadmium "
Hg- "
Chromium "
Lead
Ammonium
Copper
Zinc
Manganese
Nickel
Cupric ammonium Sulphate
N.

Carbonates

Barium
Sodium
Sodium Bicarb
Potassium Carb

Borate

Sodium Biborate

Borax
Potash Borate,
Lead Borate
Magnesium Borate -

Acids

Oxalic
Citric,
Wolframic acid
Arsenous acid

Metallic

Antimony

Zinc

Microcosmic salt.

Sulphides

Antimony Sulphide
Sodium Sulphide
Lead sulphide
Antimony Sulphide
Cuprous "
Hg
Barium
Antimony
Hg-blk —
Calcium
Potash —
Lead —

~~Amm~~ Citrate Ammonia
Benzoic Aluminum
Ammonium Oxalate
Potash Oxalate,
Acetate Soda
Aluminum acetate.
Sodium Fe Tartrate,
Barium acetate,
Copper Subacetate
Oxalate Sodium
Ammonium BiOxalate
Manganese Oxalic
acetate Copper
Mercury Resinate
acid potassium Tartrate
calcium Oxalate

Citrate Soda
Nickel acetate,
Aluminum Palmitate
Barium Resinate
Strontium oxalate
Strontium Resinate
Citrate Iron
acetate Lead
acetate Manganese
Barium Oxalate
acetate Soda
acetate Iron
Calcium phenolate
Lead Oxalate,
~~Chrom~~ Sodium oxalate,

Chromate

Calcium Chrom
Lead "
Potassium "
Cobalt, "
Zinc "
Lead "
Copper "
Cuprous "
Strontium "
Barium "
Ammonium Bichrom

Sulphite

Sodium Hyposulphite
Magnesium Sulphite

Tolyl acid —

Trichloraphenal
Chlorcralon acid
Guanidin Sulphocyan
Anthracene
Fluorescein
Eosin —
Napthalin,

Iodide

Ammonium Iodide

Barium Walframic

Ferrocyanide
Potassium

White Sand

French chalk –

White Arsenic

Infusorial Earth,

Silica

ammoniated Copper

Bone ash

Phosphate

Sodium pentphosphate
Ammonia phosphate
Sodium Hypophosphorous
Aluminum phosphate
Ammonium phosphide
Sodium phos
Copper "
Calcium "
Potash "

Tungstates

Sodium

Cyanide Pot.
Natrum Othyl Sulphuric
Cubecum prop

No 1

Dipped Aylsworth fil

No 1 Twice in 27 Ethyl
" 33 Dipi

No 2 Single dip No 33 Dipi

No 3 No 27 Ethyl one dip

No 4 1st 27 Ethyl
2nd 33 — dipi

Chems that when melted
appear to disolve No 20
(Anilin blk.) —

Amidophenol para
Beta Napthol.
Brucin
Toluidin
Ethylene Iodide
Benz amide — good
Styracin
Benzaldehyde Para good
Hydrochinon — "
Resorcin "

Sulphocarbanilid - dis 20
Toluylendiamine - pbly
Piperedene Hydrochlor queer
Toluylsaure pbly
Napthalamin good solvent

Remarks

Anilin Sulphate will
pbly squirt alone very
hot = dense carbon
scarcely any swell,

Chrysanilin has (NO_2) but think it can be carbzd & squirted alone

~~Pytalin~~ Ptyalin squirt alone
Carbon silvery

Quinidine sulph
Melts, puffs — very dense
Carbon — cinders

Anthrachinon ditto
but not so shiny

Lamp Experiment
Continues last Name

142 =

No 15

143
3000 C6f
1.000 phenanthrene,

Squirts hard - we got too
much heat & puffed it
but let it coal & got
few bad ones towards
end to ~~test~~. as I think
they will give a carbon like
43 - They havnt a dark
shine as raw fil but metallic
like I put them in to Carb to
see surface, I think

that these fils can be made
by finding a better solvent
than Amal + Ether, had to
use both in mixture
as one alone wouldnt dissolve
much as it was there was
lot undissolved stuff
got in -> perhaps hot
mal or Ether alone will
dissolve Enough, The
heat should be low +
gradual to stop forming
gases which will mar
precaution also the
powder should be dried
in oven — E

No 16

3000 Cbt. and solution of Syrian in Benzol using about same as I do alcohol— powder— took long heat finally came good but not shiny— die bad not puffed— good end on but swells terribly in spoon. so I guess they want Carbz—

[illegible] a badly surface
poor – stuck together.
so can hardly separate
any — they are ng
anyway

145 –

3 grms Carbonate
3 Salicylate Calcium
2 grammes Chloral Hydrate

I first used 3 of Cbt
3 of Sali Ca + 1 of
Chloral Hy But on
open dry powder didn't
seem to fused so I
added to dry powder
a fresh lot of 1 gm
Chloral Hy + Alcohol

The result was when got it down it got sticky & went to ingot had to sheet it over flame for [illegible] 20 minutes & then took 1/2 hour in mortar before got powder requires considerable heat to squirt, but broke short die & had use long die this might have made differ— as long die couldnt

get so much heat,
it has a tendency to
Crinkle but by giving
it long drop as possible
Crinks came out,
it squirts perfect
but the surface is not
very shiny under
Micro but looks
shiny to naked Eye
Carbo in spoon with
hardly any puff

The ash is very heavy
seems be more ash
than Carbon —

Had I added 1½ gm
ChlHy at first with
Sali Ca dont think it
would have ingalled
pbly 3 Carbonate 2 of
Sali Ca + 1 Chloral
be OK = End on notes

[illegible]

slightly but [illegible]

but few could be separated

giving very rough surface

Spun off – [illegible]

Lime –

146 –

3 grms Carbonate

2 grams Salycilate Calcium

1 gram Chloral Hydrate

Went to powder but it had tendency to be sticky didn't [illegible] at though after 20 mins got it to powder but not fine – used short die 5½ /1000 Surface not good shiny with too much heat puffs bad had let cool down then squirted fine but there is a great tendency

to crinkle but 3ft more
drop would correct that.
If surface was only shiny
they wld be OK. very
little puff in spoon.
End on not dead shiny

146 —

Stuck together but not so bad but fils are rough and all pitted, this would do perhaps 1/2 or 1/4 gm Saly Ca would do

147

Shiny but stuck together & badly shrunk —

147 —

3 Carbonate
1 Salicylate Calcium
1 Chloral Hy

goes to powder but shows tendency to ball in fact it balls some & its impossible to get it to a fine powder hence in squirting it tends to crinkle & also except. Very hot it shows lumps fils squirt perfect shine first class little more puff in spoon

Uran 146

I think 750 chloral will do
must get to fine powder

End on very shiny perfect

148 —

Stuck together, shiny
but colapsed in vacuo

148 -

3 Carbt
1 Saly Ca
750 milgm Chloral H

goes to powder ok no tendency
to stick, ground to fine
red powder - after getting
it very dry put powder on
paper with beaker over it
to wait for freddy who
has gone to dinner 1/2
hour under paper/
we put it in press & heat
but white perfect shiny

it has those Lumps
We heat till it puffs a
little & let it cool of
then reheat gently -
it squirts easy enough
but its Lumpy & great
tendency to Crinkle
surface perfect shiny
it would be very troublesome
to make this go -

~~149~~ Notest

3 CbT
1 Lactate Calcium
750 mg. Chloral Hydrate

No good squirts rough – liquid comes out at die + deposit n fil as squirt. film rough brittle, Ng Oleam also comes out

~~149~~ — No test

3 Cbt
1 Sulpho Carbolate Magnesia
750 Mg Chloralhy.

goes to powder good
not in least sticky
powder red & fine
as reg Cbt —
when we come to sqr
its full of water
& took ~~the~~ whats
remaining of mg of

Repowdered & dried
in paper over flame
till ChlHy came
off then put back
in press —
its ng — rough &
brittle, may be fm
want of ChlH
which went off in
drying

149

all stuck together but
file good — oxidize to point
if previously dried think
they will carb OK
When files are all close
together they are badly
melted but where a file
is seperate its round &
good — showing that
the chloral must be
driven off — or the files
seperated & a draught
given to clear away
the Chl Hy

---

149 prelim of
1 & 2
in char all froze together
bad surface
are all cracked)

3 cbt
1 Salicylate Magnesia
750 — Chloral Hy —

wouldnt go to powder
but while powdering I
forced it into a very
stiff ingot by pestle
& couldnt finger it except
over flame, ~~squirts~~
with very little heat to
give shiny surface
squirts perfect shine
perfect but files not

all perfect, they stick
together on finger but
by using splint +
letting them go on it
long + put to dry
formed loop without
sticking =
The Compound of
Sali Mg + Chelt is
sticky so I am going
make one of 500 mg
Chelt & try dry it

[illegible] [illegible] shown
that of [illegible] [illegible]
[illegible] OK -

150 — pedumbox
3 & 4

3 Carbonati
1 Salicylati Magnesia
500 mg Chloral Hy

cur all cracked & shrunk but not so bad — None came out charcoal

Went to powder but only
after a time as it got
Sticky lumpy — The
powder was not fine but
fairly so showing
under Micro balls
used but little heat
squirts perfect fils
beautifully shiny
very little puff in spoon
plenty ash glassy

end on - there are specs
in fil however -
altogether this fil is
best yet of ash fils -
think 400 mg Chloral Hy
would be about right,

fils tough -
dont oxidize when put
right in flame instantly
like Ca Sali -
apparently Mg more
intimately mixed with
Carbon -

Melted ,

151 prelimbox 5+6

5 inches good but shows tendency freeze sawdust wld fix our fils are cracked & broken

3 cbt

1 ½ Salicylate Magnesia

600 mg ChHy

Went to powder but its slightly sticky & took 20 minutes to get it to coarse ball powder —

squints fair. There comes lumps about 3 times in whole — The fils. are the finest we have seen, glassy & scarcely any specs — no cracking used very little heat, they are however very sticky so those taken over finger stuck together. had to put on stick + dry afterwards bend in glass – they are tough at first at least very little puff in open am going try 400 chkdy instead of 600 see if cant get it dry Evidently Saly Mag dont Crystalize in drying hence the sticky + fine polish

actually exactly
melted -

152 -

3 Cbt
1 1/2 Salicylate Magnesium
400 mg Chl Hydrate

goes to powder but its little sticky got it to powder but not fine powder just micro balls very little heat just Enough to polish squints perfect without a hitch fits perfect shine glass

very few specs, seem to
be even + perfect no
kink'—
as 400 is just as sticky
as 600 we are going
to try 200. Chetty -
fils are little sticky on
coming out so caught
them in bamboo straight
& bent afterwards on
glass no heat, in bending

The fils are all actually
melted =

153

3 CBt
1 1/2 Salicylate Magnesia
200 mg. Chlorethy

---

goes to powder but slightly
sticky but not so much
as 400 chetty gets less
sticky as chetty diminishes
the powder is finer than
400 but there are some
micro balls —
Squirts fine — feels not
sticky — brittle when
dry don't know if I
can get any to CB3

a & I took them over a splint & they bend badly (i.e) brittle, may break – They have more specs than 400 my impression is that 400 will be found to be the best with 3 CBt 1½ Salymag –

~~154~~

No test

3 CBP
1 Salicylate Strontia
500 mg Chloral Hy

Ng wont expel water in it or its due to fact Saly Crystalizes

[illegible] all [illegible]
bent where detached
fil. good showing that
if [illegible] draughted.
62 OK =

154 prelim 7+8

3 Cbf are all cracked & Rough
chan. very rough ng

1 Salycilate Lithia,

500 mg Chl Hy

Yosts Sticky powder
impossible get it fine
its so tough sticky —
Lumps — it $\frac{1}{8}$ dia
Couldnt get it finer
but guess it will
squirt OK

Squirts absolutely perfect
fits perfect - glass
puffs much in pan
slightly sticky had
to take them on stick

Badly shrunk puffed
perhaps with Ventilation
brought [illegible] CO2.
but seems to be extra tendency
to [illegible] 56 =

155 Picken 9410
NG [illegible] Chas

3 Carbonate
$1\frac{1}{2}$ Salycilate Zinc
500 mg ChlHy

goes to powder better
than 154 not very
sticky powder not
fine say 60 mesh,

Squints OK specs
shiny glass
not sticky =

Attorney McCleod

156 1142

3 Cbt
3 Salycilate Magnesia
750 Chl Hy

are all cracked but
not so bad
char ok but
puffed shiny
possibly
sawdust
ok

goes to powder ok - not sticky

Squirts perfect fil even + perfect, very little heat
fil not shiny only little shiny more shiny than lampblack, very little puff right in flame

Large ash —

actually HCl)

15%.

3 of Anchor Ruth powdered)
fine

1 $\frac{1}{2}$ Salycilate Mag
500 mg Chl Hy

Used excess alcohol - all dissolved - got it thick viscous but thin - had to gather on pestle & work over flame with pestle & spatula, then it powdered ok -

Squirts ok but pieces in it - shiny film but very brittle shrunk on

finger so they are
uneven — Melt in flame

Tried

4 Induline with arsenic
750 mg ChlHy
in Mal -
Works fairly well
but too Lumpy am
working Same arsenic
Indulin in Gasolene
& will try again -

158

3 Indulin arsenic free
3 Salycilate Magnesia
500 mg ChlHy
all dissolved in Dipi
its now 2 hours & I
only got it Sheeled
& put out to dry
then ingoted & soaked
over flame half hour
then put ingot in
dish for over night

in morning it was
brittle although had
fire over it got it
to powder (fine) but
on trying it on spoon
it melts & puffs dreadfully
so have put powder
out to dry in watch
glass until it will
only slightly puff
in platina spoon

[illegible] Chg ok of
[illegible]

159 —

Arsenic Indulin
[illegible] process
750 CHCHy —
Mal

at first squirted good
fils shiny some spots
little tendency
Granular finally some
Chem change took place
& while fils good they
were so brittle couldnt
hold down weight
broke off short must use
less heat for more sticky

probably 1 gm Chlor

got enough of first
1½ oz for about 9
grains

100

~~1½ Cbt~~
~~3 Sal Magnesia~~
~~500 Chl Hydrate,~~

6 Cbt
2 Chl Hydrate
10 cc of Sol of Acetate Mag
in Lukewarm Methyl Al for
12 hours -

got to dry powder split it in
two parts first part Too
rough drags ng - 2nd part
dryer, still not got, then
took 1st ingot repowdered &
dried in oven, as all the
Chl Hy prbly went off wldnt
squirt, 2nd ingot I powdered
& when powderd poured
Ether on powder this
precipitates acetate Mag

got it ~~fa~~ dry but it
went to dark powder
not yellowish —
the films are fairly good
shiny & quite perfect,
there are specs in them
think if Ether had been
more & allowed soak
longer it would have
gone in particles & —
thoroughly precip the
acetate & stopped the
drag — the acetate
when evap. down goes to
a syrup & finally to a
sticky contains

gum — it's this that
makes the drag —

It's probable a good
deal of Chl Hy went
off so I'm going to
make a fresh batch
& precipitate thoroughly

Made a 3 hour prelim
to dull red — surface
very bad, slightly puffed
in places fine longitudinal
splits — Not stuck together
I noticed these fils even split
longer in water bath oven

161.

6 Cbt
2 ChHy
10 cc sol acetate Mag
same as 160 —

I put the 10cc acetate in first & ground to powder & apparently dry then put it in Oven & dried it still further until it was quite dry & yellow — then added the ChH in 15 cc of Ether & worked to powder.

divided in two parts

1st part large die very little heat, squirts perfect fil shiny & perfect except fine specs now & then -

2nd part is drier powder having been in mortar 25 minutes, Can smell Chetty - we use a small die —

Its squirts perfect fils. shiny but has these specs in not sticky

puffs very little in pan ash large -

prolonged to dull red 3 hours - fils very shiny - both 1st & 2nd but swelled a little giving hollow fils where swell - also stuck together (ie) 1st part but a little slower they wouldn't prob'ly stick. However there is too much ChlHy showed be reduced to 1/2 the amount. No 161 method of first putting in ash liquid & soaking to dry powder & subsequently using Ether sol of ChlHy is the right way as 160 has miserable surface while 161 has elegant surface — 2nd part being fine dia brake at loop

in Cl_2 this shows where fils are bunched the ChlH softens whole too much — must not bunch fils hereafter

162

6 CbF

[illegible]

10 cc acetone neg

1 gram chlory

162 = ng

163

6 Cbt

Then 10 cc of standard acetate
Magnesia sol is precipitated
by ammonia to jelly – This
is diluted with alcohol
& filtered, filter washed
with 3 or 4 times back
alcohol, ~~then~~ the
jelly is mixed with 10 cc
alcohol & poured on Cbt
& ground ~~f~~ very fine
after getting powder yellow
dried it in water bath
1/2 hour & repowdered
& then dissolved it

in two parts,

putting 1 gram chetty
to 3 CBt the chetty
being in Ether, got dry
powder —
squirts fair but its
very sensitive to crinkling
although the crinkle fils
even look better than
straight, used jets only
1/8 length of cor might
heat it puffs the filament
badly = scarcely any
swelling in paw,
ash evenly distributed

fils shiny but specs
in + [illegible] (not absolutely
perfect as could be desired)
have to squirt slow –

164 is second half of
163 – but with 800 mg
Camphor in Ether
squirts fine fils fine
Ohmy even OK
scarcely any puff in
Operation by far best yet
as far as puffing
is concerned
Carborundum (splendid)

165

6 Oct.

20 cc of standard
Acetate alumina —
~~[illegible]~~ precipated as in No
163 @ 164 — & worked
same dividing in
2 parts first part
1 gram Camphor
2nd part —

---

put into Metal with the
Opal pp so stuff fully
wet + ground to

yellow powder fine then
put it in water oven
for 25 minutes and
Repowdered & divided
in two parts,

1st 1/2 put in 1 gram
of Camphor in Ether got to powder
squirts OK but have to use
strong heat. before shine
comes even with this
heat dont puff -
shews wants little more

Camphor -
The fils dont puff right in
flame - end on fine -
very even no lumps
big die -

2nd pt,
Put in 1½ grms
Camphor, but it
worked no better as
regards shine in fact
not so well - the dies
have got to be smooth
& not rough to soak.

with high ash =

The probability is that
15 cc standard sol
+ 1 Camphor will
be best with
Smooth discs —

166 —

6 pts Cbt.

40 cc of cold sat Sol
alum in water 4 hours
in bottle with [illegible]
large [illegible].

The 40 cc poured in beaker
3½ dia with 3/4" of
water & pp by ammonia
filtered & washed 6 or 7
times by water & 3 times
by [illegible], then 1½" al
in small beaker including
the jelly brought to powder

[illegible] dried [illegible]

until Mal smell gone

divided in 2 parts,

1st part. weighed
2590. [illegible]

1 gm Camphor — its a beauty

Ether

Consider this ~~to~~ get free appearance

3 hour cbz fils shiny but flaws, ~~[illegible]~~ small fil dont stick together on slightly but practical

Squirts fine shiny

some flaws, if too much

heat puffs so I will

good End on puff some in spoon but shiny in spoon

put in 2nd part 750

Mg Camphor — ~~[illegible]~~

squirts fair lumps once

in while stops die also

lumps show drag spots

at times — fils fairly

shiny — but great tendency

crinkle — it wouldnt be

practical this fil,

Al Tri Hy isnt so good

as Mag —

3 hour Cbz'n all good but surface not shiny — because not originally so —

[THIS BOOK WAS USED IN BOTH DIRECTIONS.
THE FOLLOWING PAGES WERE FILMED FROM
THE BACK END FORWARD.]

Copper

Cuprous Chl—

Tui chl

Notebook, N-87-03-01

This notebook covers the periods March 1887 and March 1901. All entries are by Edison. The first entry is undated and relates to battery experiments. It is followed by a set of notes and a drawing from 1887 pertaining to the development of an economical prime motor (probably his magnocaloric motor). In the course of making these notes, Edison recorded a discovery regarding magnetized iron. Following these entries are additional notes about battery experiments. The next dated entry is from March 1901 and concerns Edison's theoretical speculations on electricity and magnetism. There are also a series of hypotheses and some notes about thermoelectricity. The remainder of the book consists of miscellaneous notes, drawings, and calculations about thermoelectricity and batteries and some drawings that appear to be plans for an ore milling plant. The book contains 284 numbered pages.

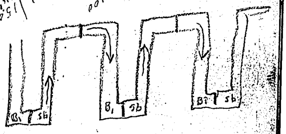
Blank pages not filmed: 48-75, 78-97, 114-135, 168-175, 182-259, 266, 269-271, 276-277, 280-281.

Missing page numbers: 267-268.

No 40987
ARTHUR & BONNELL
MANUFACTURERS
55 CEDAR STREET
New York

Bi pt elc Pos E goes from the Cold piece
to hot piece

& in neg metals Zn Fe Sb from
from hot to Cold



500000

24) 15000 (625
144
60
48
1

650 HP
50
32500

30f 450000
=
5450000
750
600

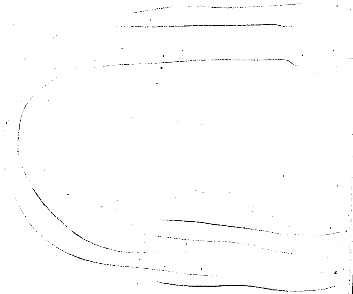
2000) 1500000 (750
14000
10000
1

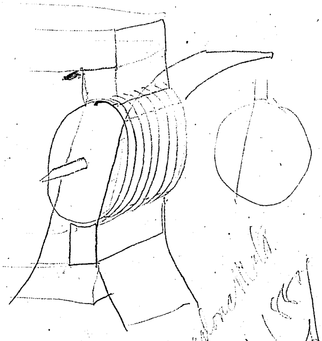
2000) 15000000 (7
14000000
1000000

30. HP – 50000
50000

The object of this invention is to produce a simple & economical prime motor

The invention consists in producing a dysymetrical magnetic distribution of the lines of force in a magnetic circuit, by means of heat acting ~~The disturbance~~ on the ~~magnetic substance~~ The disturbance taking place in the movable part of the magnetic circuit, so that

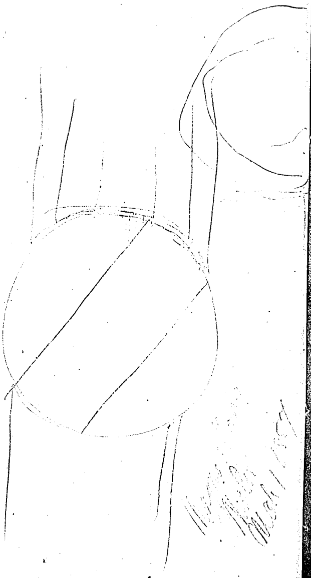




Magnetic Motor

Mch 1 1887

TAE



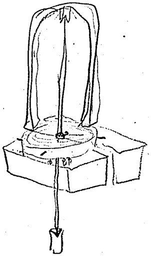
[illegible]

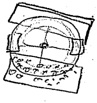
Arbor
March 1
[illegible]

Continuous rotation
takes place as long as
heat is applied to the
moveable magnetic part
of the magnetic circuit
~~I have discovered that~~
~~when Iron is powerfully~~
~~magnetized~~ ~~that~~ say near
~~its saturation point~~, that
a ~~very small quantity~~
of ~~heat produces powerful~~
~~changes in its magnetism~~
It is well known that
the magnetism of
Iron & other paramagnetic
" bodies is diminished by
heat

I have discovered that when the iron is powerfully magnetized say nearly to saturation that its magnetism is extremely sensitive to heat, a slight increase of temperature produce a powerful diminution of magnetism, so that a great portion of the energy of the heat is transformed into actual motion for various uses. ~~the~~ in fig 1 is a simple ~~a~~ Apparatus by which

~~I utilize this phenomenon.~~
& illustrates the method
by which this phenomenon
is utilized

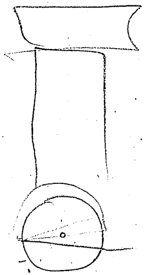




In the prime motor the use of one or more magnetic circuits of which one or more parts are moveable & the application of heat to one or more parts of magnetic circuit to produce motion

---

In a magnetic circuit of which one part is moveable. The disturbance of the magnetic ~~[illegible]~~ lines of force by heat to produce motion



Conductivy fused salts Braun
Pogg Ann (Cliv 161) Conductivity
in vicinity of melting points
if Hg at 0° Cent is 100 000 000
& best H_2SO_4 solution 7.700 —

then

$PbCl_2$	32 200
$NaNO_3$	11 475
$AgNO_3$	8688
$NaCl$	8660
KNO_3	6500
Na_2SO_4	3680
$SrCl_2$	2260
K_2CO_3	2150
$ZnCl_2$	85 — ? ?

Solid is 500 times greater R than Solution —

Reg water Solutions have generally a lower res except — Case $ZnCl_2$ which is Extraordinary low —

Cryolite melts below red heat

Teloroxide containing melts below red heat,

Positive Ions

$H^{\cdot}$ Na K ag Hg, Hg''

Fe'' Fe''' NH_4 NH_3CH_3 etc

Neg Ions OH NO_3 Cl Br I SO_4'' $FeCy_6'''$ $FeCy_6''''$ etc —

March 12 1901

Theory

1 The combination of an atom or molecule of Oxygen with a molecule of Zinc in a battery has the effect of a general Expansion of matter. This increase in bulk sends a wave through the wire — The wave is like a sound wave as regards the wire & a wave in the Ether at right angles to the wire — all Combustables, or matter not reached its Zero potential is condensed as to the ether —

2 The whole of the wave energy is lost in Expanding matter by the absorbtion of heat + performing work of expansion — Sensible heat is the effect of the absorbtion by matter in the act so to speak

3 The wire is a good or bad Conductor according to the elasticity of its parts viscosity + the distance apart of the Molecules — The further they are apart the worse the Conductor

4 Any translating device inserted in the Circuit is merely an agent to transfer the wave into heat at other points

5 The amplitude of the wave or EMF depends upon the Energy of Combination of the Combustible with Ox. Cl etc The wave will have a greater amplitude from O + Mg than from O + Cu — as the Expansion is greater of the products —

6 Putting 2 cells in series doubles the amplitude of the waves, if the Res is the same doubling the amplitude doubles the Current + quadruples the heat, The number of Vibrations is the same as with one cell — the extra energy goes into increasing amplitude

7 If the resistance is doubled there will be the same number of Vibrations, their amplitude will be half the Current will be half and the heat will be 4 times less than in the single circuit R — total heat twice

8 The waves passing over the wire proceed like sound waves. These waves send a wave into the Ether at right angles to the wire -.

9 A Coil of wire concentrates a large number of waves in a small area - They form together a large compound wave in the Ether

10 A Magnetic Metal within a Coil the large wave is sent into the iron - The iron waves send contrary waves into the wire diminishing the length of the primal wave to do this the iron must be at right angles

11 The Capacity of the Iron to send back waves quickly diminishes, as its molecules become arranged against their normal Condition in Connection with the Ether =

12 The magnetic metals are magnetic because their molecules have little Elasticity were they as elastic as Copper they would not be magnetic or they are connected to the Ether in a manner different from the non magnetic metals)

13 when magnetized their molecules are condensed like Zn in its relation to Ox as to the Ether when demagnetized Expansion takes place & work will be performed.

14 If surrounded by a closed wire the work will be performed in the wire, if no wire the work will be performed in the magnet it will be heated —

15 = The wave on the wire & the wave through the magnet is the same. The reason ~~that~~ the mag is placed at right angles is that the wave on the wire proceeds like a sound wave this make a wave in the Ether at right angles & this striking the Iron is reconverted into a wave travelling in the iron like that on the wire What we call magnetism

is simple as recorded or fixed Electric wave not moving — its like Tourmaline —

16 = The further the Copper molecules are apart the greater the local heat, from the passage of the wave, if the molecules were in actual Contact & all infinitely Elastic the wave would have no resistance & the whole of the Expansion energy of Battery Combustion would take place on the Zinc molecule a liquid — yet the Current would traverse the wire —

17 All Electrolytes dissolving in water, combine with it with great power but instead of giving off heat the Energy is stored in the form of Electric charge. After the Electrolyte has combined with Water it requires a large amount of Energy to separate the two such as Evaporation Etc, as the boiling point is raised for instance if boiling point ~~[illegible]~~ of a pound of water is raised 1 deg then the Energy of Combination of the Electrolyte will be represented by the Extra Energy of 1 deg in Evaporating the whole of the water by distillation so as to

H_2O K_2O

$2KOH$
KOH.

put the 2 Compounds back into their original position – change of temp of water is due to, Combined solution of a solid in a liquid.

18 = adding a Combustable to water will not make it Conduct, adding a combustor like O Cl I to water will also not make it Conduct but adding the products of a Combustion like [illegible] KCl Will make it Conduct –

19 – a liquid with 2 combustables ~~without~~ like a hydrocarbon will not act as a Electrolytic Liquid –

20 = a liquid Chloride of a metal with the Oxide of a metal if one could be found ~~that~~ will dissolve should give an Electrolytic Combination but not if the there is a great Excess of Chlorine in the Chloride-

21 This rule ought to hold with anhydrous fused substances

22— There is no Pos Elec passing in one direction & negative Elec passing in the opposite direction, this would be absurd— just as a Sound wave rarification would be positive Sound & condensation of barometric press the negative Sound—

22 = Electricity must be of one— Kind simply a wave in matter Connected to the Ether, That part of the wave which produces Condensation of matter produces certain Effects while that part which produces Expansion produces other Effects - Chemically + otherwise

Oxy combining with Zn produces Ether Condensation + O being freed from say CuO in a battery Expansion—

23— A magnet or a piece of Electrified sealing wax is simply a recorded wave. one End. Condensed the other Expanded. The two naturally tend to fall to Zero

24= If in a conducting circuit one part be rarified & the other Condensed a Current will flow — (1e) Thermo piles — or cells

25= Zinc is ~~produced from this oxide by~~ a forced decomposition requiring energy ~~absorption of~~ ~~heat~~, hence in a battery, it is the ~~Cold~~ Hot Equivalent of the junction. ZnO is produced by a forced combination ~~heat~~ hence its the Equiv of the ~~heat~~ Cold juncture — The greatest forced decomposition & Combination, gives the greatest Emf —

26 =

Hence the best thermo would be a juncture which one metals has a heat Conductivity diminishing with the temps & the other increasing with the temperatu

27 or one metal increasing or diminishing
faster than the other,

28= Or two metals which when
reaching a certain temp
one would require a greater continual
supply of heat to hold it in
its strained condition than the
other —

29 - Condensation in matter produces
heat, Expansion absorbs heat
for instance bend hard rubber
one side heat, compressed, the other
side cold, Expanded.

1000 times worse Cop
1" face 1/32 thick $\frac{1}{20000}$ ohm
20 in series $\frac{20}{20000}$ ohm or
1/1000 ohm, 1 Volt 1000 amp
It is — 100 Volt amp
$\frac{15}{10000}$ $20\overline{)\frac{1}{20000}}$ $(1000$
20

7500 Voltamps — 10 HP

1000 times worse Cop

$\frac{1}{2000}$ - ohm 1 ft

1/2 ohm ft $\frac{1}{4}$"

$12\overline{).500}$ $(.041$
48
20

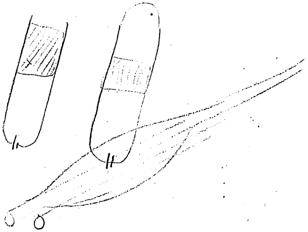
.041 1" long
0015 $\frac{1}{32}$
00

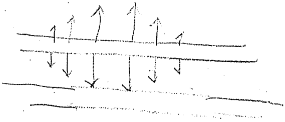
Notes to be entered in other book —

Spring mixed Potassium Nitrate & Sodium acetate, solid but powdered, & subjected them to Temp 100 Cent, both salts fused into ~~o~~ one mass although K nit & ~~Na~~ Na acetate fuse about 330 Cent —

This shows possibility of "alloys" of lower MP for solid salts, in Re Coal direct & dry battery delande —

Write Johnson Mathey & Co Hatton Garden London for catalogue of Metal Chemicals etc priced





All dielectric let store work on closing a wave of ct passes into them & ceases –

All paramag let store work on Closing ~~[illegible]~~ a wave passes into them as then seems to full –

Hypothesis

No 1 = Most powerful thermo is
when one metal or substance
dimishes its conductivity by heat
while the other increases its condcty
by heat — ~~or [illegible]~~ C Se Te S. Carbon
Fe Exception, Sb S.S

No 2 = The best 2 metals are those
one of which has the greatest
specific heat + the other the least
atomic or Equal bulk or equal wts

No 3 One where one metal has
the highest conductivity over an above say glass for heat 1
+ the other the least

4 The metal, or Compound which has the greatest Expansion by heat & the one with the least,

5: The Metal or Compound which is nearest its melting point & the one furthermost from nit

6th The Compound which has its heat Conducting increased by heat & nearest it melting point with a metal has has its Conductivity diminished by heat & is furthermost from its melting point -

7 = That compound whose Crystaline form or allotropic Condition leads to change the most by heat with that metal or Compound which tends to Change the least,

8 Iron is the opp of Bi - but at red heat it changes its Character & goes on Bi side now. The change from Bi " to Fe side takes place when Fe has diminished Capacity for heat, hence No 2 Hypothesis

9 = If Specific heat, is proper Hypo ~~then~~ 2 Compounds one of which has the greatest spec heat per ~~square~~ cube inch & the other the least

P

11 = Fe gets plastic
Zn " " where it can be rolled
Carbon gets plastic in filament
Does arsenic + Sb —

Neg

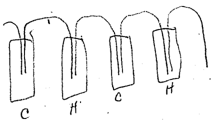
Selenium gets crystaline at high heat
Sulphur " " "
Does Bi + Te

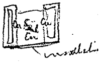
10, The compound which has the greatest spec heat per oz + the other the least

10 The Compound which has the greatest specific heat per gram molecule the other the least,

11 - The Compound which by heat gets more plastic or viscous with one that gets more brittle or less viscous - independent of annealing action —

Wednesday ~~tb~~ plant,
Thursday Lucen
Friday plant
Sat Lucen





12 — from metals or Compounds
Crystalizing in the Cubic system
with Compounds Crystlz opposite
or amorphous —

13 Compounds which crystalize
in one form which has a
~~tendency by heat to~~
change to the other form
+ metals which act in
the reverse direction

14 = Compounds whose Crystals
act like Tourmaline but
are Conducting + have a certain
form of Crystal which directs
the Current with analagous
Compounds with Crystals
which direct C in opposite
direction —

good

15. Iron Ni & Co will act different because their molecules are arranged different in relation to the Ether of space than other Compounds —

16 = Compounds which are at normal temp. arranged with the Ether in one way & Compounds at same temp which are arranged with the Ether in the opposite way

17 Magnetic Metals will act different because their Crystals are peculiar & different from all other substances in relation to waves like E

also by fusing Copper Nitrat & KOH at red heat

Note - Is paracyanogen a Conductor will it act as a Thermo Element

---

Mendeljeff p 405 2nd vol foot note says Cupric hydroxide acted on by Potassic Hypochlorite gives a peroxide of Copper CuO_3 which combines with the K very slightly heating the sol. sheet formed charring it & CuO_2 is precip — Make Lelande

It might be a good Idea
to act on Iron Cu Sb
Tin, Etc with Hypochlorite
see what can get for
Lalande —

goes Expmts thermo of liquids

P

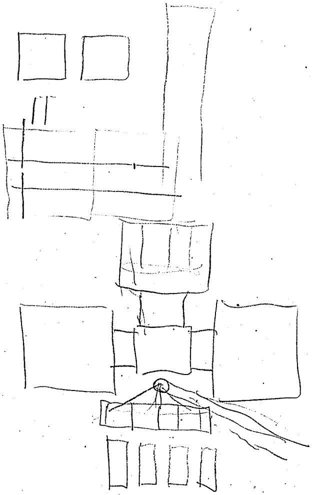
Cu Hot

HCl X
HCy X
Boric X
Ortho Phos X
Cupric Chl weak
CoCl
Manganous Chl
Chromic acid
Chromic Chl
Zn Sul weak Sol
Mg Sul
CuCl
Sr Nit
Sr Chl
Ba Chloride
Na Nit strong
NaCl
NaI
Carb Na
Diborate Na

Na Sul strong
Disodic Phos
K Nit
Nitrate K
Chlorate K
K Bromide strong S
Ca I strong
K Carb
Hydro Carb K
Bichrom K
NH_3
NH_3 Chl
KCy
Ferro
Zn ac
Na act

Neg-Cold Cop-

Nitric Acid
Chloric Acid
Hydrobromic Acid
Hydrofluosilicic
Sul Acid OK
Ferrous Sul
Cupric Chl Strong OK
Cu Sul
Zn Sul Strong
Na Nitrate
Na Idide Weak
K Iodate OK
Chrom alum
Ammon Nit
Oxalic OK
Acetic OK
Tartaric OK
Citric OK



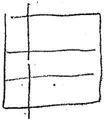
3 1111

48
2
96
12
192
96
1152 500

1728) 57600 (222
5784
5760
5784
5184
5760
576

2

3) 250
83

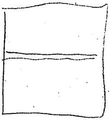


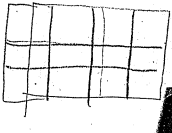
)500

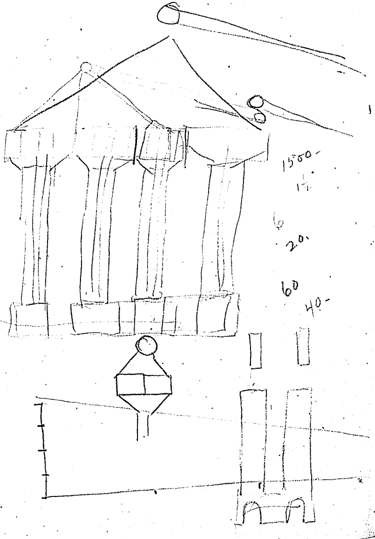
12
500

1152

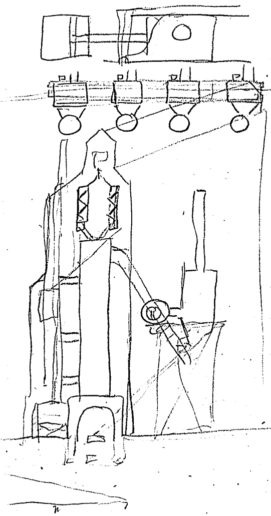
500
6) 2000
2240) 33360 (14,8
2240
10960
8960
19400

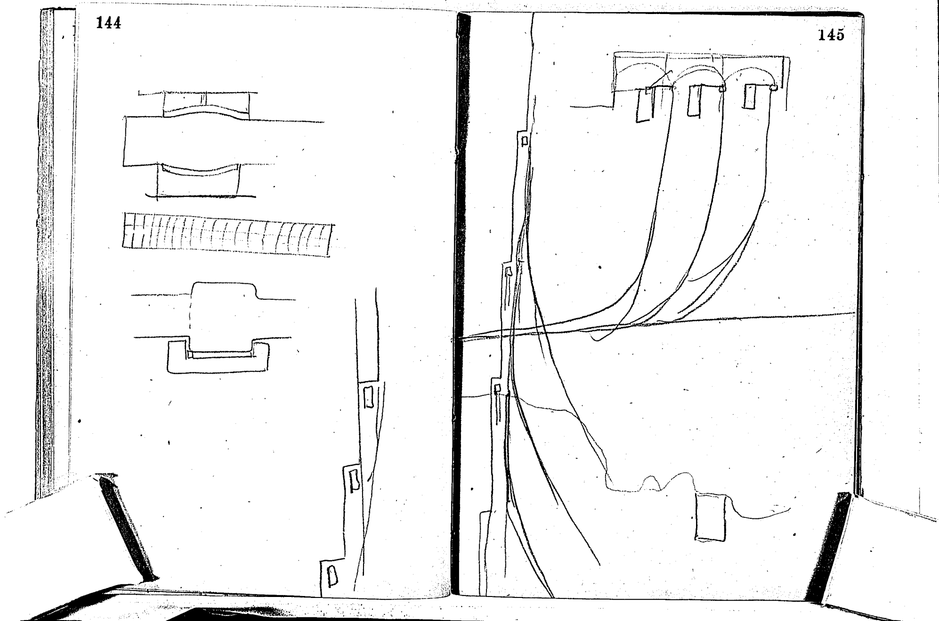






1500-
1½
6
20.
60
40-




144
145

p

32 25 500 104

12) 1,250
1,2 30
360 1)3000

104
120
208
104
124

2½ c

3.400 000
14
136 00 000
34 00 000
17)600 000
3400

30-
150-
140

100 64
25600

5 175
140

60-
2000
)1200000
400

3400000

14) 4800000

3) 150
50
70

400

1200 400

10 000
80
80 000 000

300-
4000
1200000
300

14) 3600000 00 (25714285
28
80
70
100
98
20
14
60
56
40
28
120
112
80

5) 30 000 000
6

8 yrs

60

25 000 000 -

14) 80000000 (5714285
70
100
98
20
14
60
56
40
28
120
112
80

Cont
X =
= X

SO_3 Na
H – O

H O
N SO_4

H – O
SO_3 – Na

CH_2 OH
Cl – Hg

K . Cy
O — H

/ Zn Cl
Je H

$H_2O.SO_3$
O . H_2

H_2 SO_3.O
H_2

SO_3 H_2 O
SO_3 Na ~~O~~

Na Cl

H Cl.

C_6H_6 – OH,

C_2Cl_2
Cl Na

C O.
O. Na.

SO_3 K
~~[illegible]~~ Cl

nSO_3 K p
pNa – SO_3n

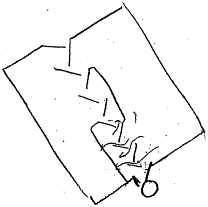
Antimony with Zinc
1 part of Zinc in 1 2 3 4 & up to 100. parts of antimony
This will give a series of alloys starting with 1/2 Zinc & 1/2 antimony & increasing in antimony until the last alloy is 1 of Zinc & 99 of Antimony

---

2nd — start with 1 ~~part~~ of Antimony & one part of Zinc & then 1 of antimony with 2 3 4 5 & up to 99 parts of Zinc.
This will give every possible alloy of Zinc & Antimony 200 of them —

Bismuth & Antimony — same number of alloys 200 as with Zinc & Antimony —

Bismuth & Zinc	200 alloys
Bismuth & Cadmium	200
Antimony — ~~Zinc~~ Cadmium	200
Zinc & Sulphide of Lead	200
Antimony & Sulphide Lead	200
Bismuth & " "	200
Cadmium & " "	200
Zinc & Sulphide of Copper	200
Antimony & Sulphide of Copper	200
Bismuth & " "	200
Cadmium & " "	200



Zinc & Tin
Antimony & Tin
Cadmium & Tin
Bismuth & Tin

Tellurium & Antimony
Tellurium & Bismuth
Tellurium & Zinc
Tellurium & Cadmium
Tellurium & Lead
" & Tin
Selenium & Antimony
" & Bismuth
" & Zinc
" & Cadmium
" & Lead
" Tin

Zinc + Phosphide of Copper
Antimony + "
Cadmium + "
Bismuth + "
Tin

Zinc + Phosphide of Lead
Antimony + "
Cadmium + "
Bismuth + "
Tin

Same with Phosphide Antimony

Zinc + Phosphide of Iron
Antimony + "
Cadmium + "
Bismuth + "
Tin

Zinc + Monosulphide Iron

Antimony + "

Bismuth + "

Cadmium + "

Tin +

Lead +

Zinc + Monosulphide Nickel

Antimony + "

Bismuth + "

Cadmium + "

Tin +

Lead +

Zinc + Sulphide of Antimony

Antimony + "

Bismuth + "

Cadmium + "

Tin + "

Lead + "

Zinc
Lead
Tin
Antimony } and Arsenide of Nickel
Bismuth
Cadmium

Zinc
Lead
Tin } & Arsenide of Lead
Antimony
Bismuth
Cadmium

Zinc
Lead
Tin } & Arsenide of Iron
Antimony
Bismuth
Cadmium

Zinc
Lead
Tin
Bismuth
Cadmium
Antimony
} and Arsenide of Antimony

Zinc
Lead
Tin
Bismuth
Cadmium
Antimony
} Arsenide of Bismuth

$$\left.\begin{array}{l}\text{Zinc}\\ \text{Tin}\\ \text{Lead}\\ \text{Bismuth}\\ \text{Antimony}\\ \text{Cadmium}\end{array}\right\}\text{ \& Arsenide of Copper}$$

powdered Tourmaline —

Oxalate of Calcium —

Lead salt of Hydrosalicylamide
Watts H — 219 — Electric
by friction —

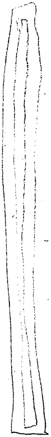
Tungsten Bronzes —

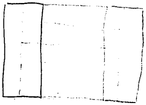
Selenide of Iron Hard
& brittle Metallic like

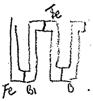
Leucophane Electric
by heat "H" watts 584 —

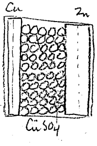
Di-Cupric phosphide
Conductor — 2nd vol Watts
73

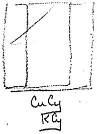
Niobium Nitride Conducts
Electricity —







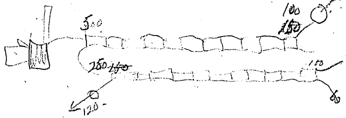


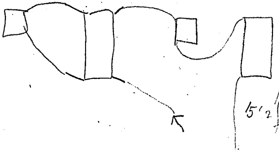


65
31
69
90
250

5H2O
450
500
1310
26

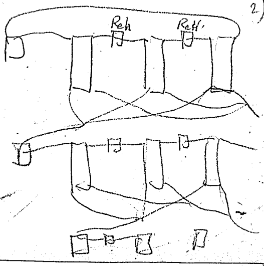
6

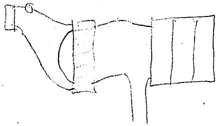


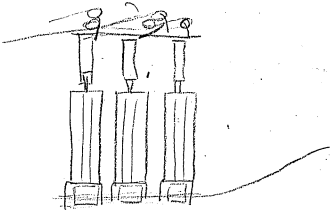


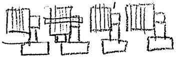
250
50
5 2) 300
150

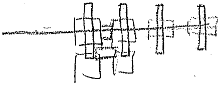
4 5
2) 450
225

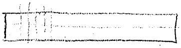




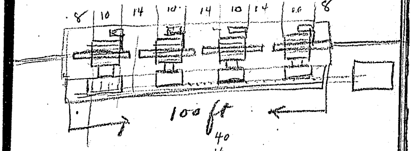








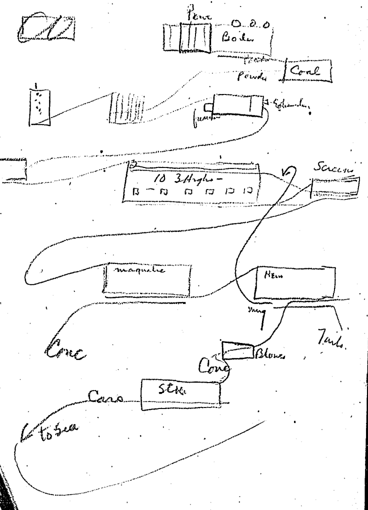
Dryers —

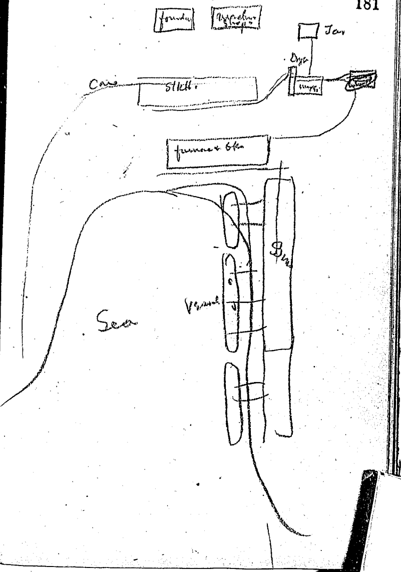


40
16
42
98 –

1.00

15/500 (25
450
50





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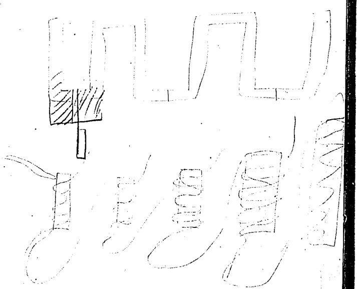
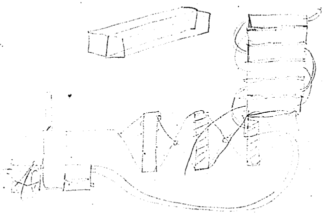
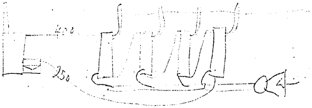
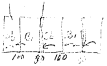
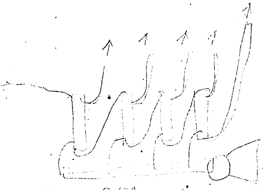




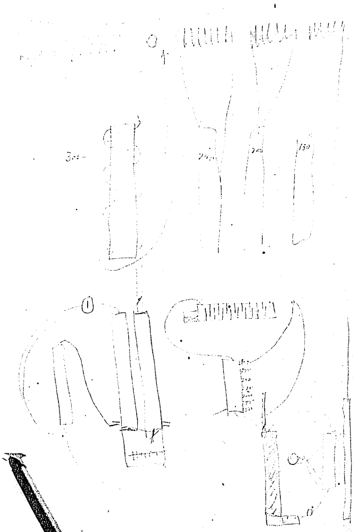


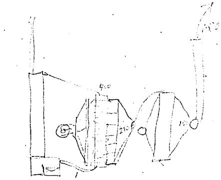
400
250

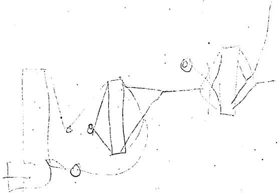


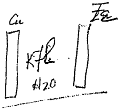


250
150



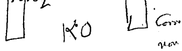




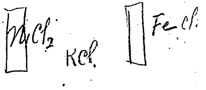


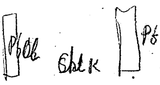
all metals but Hg ag au Pt to a certain degree: Pb decomp Hydrofluoric acid

Salt of Fluoride PbF_4
Corresponding to PbO_2



Lower[illegible] stable form is Bifluoride Lead $PbHF_2$ Corresponds to PbO — non metals dont, Te, S, Se Si?





Hfluoric acid forms acid salts
this is bad — HKF_2

If a metal had no resistance & the internal resistance of the battery was nothing there would be no current flow as there would be no way to transform the pressure waves due to combustion — in other words at absolute Zero No combn possible —

400) 3700 (

4000) 370000 (92
360000
10000

300) 10000 (33
9000
1000

300

200

7c

75

400
500
1400
1400
3700

5) 20.000

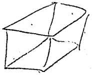
20

14) 2000 (142
14
60
40

142
3
426

35
4000
14000

100



2 150
20
300

5) 300
60

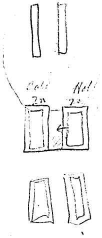
100

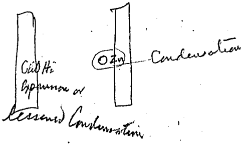
:7

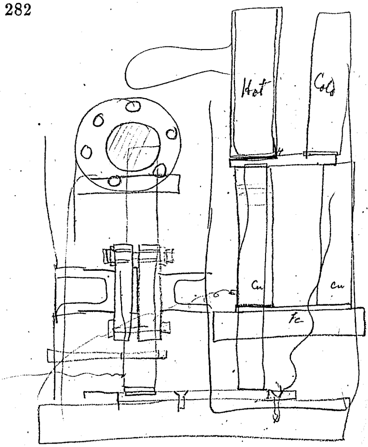
2

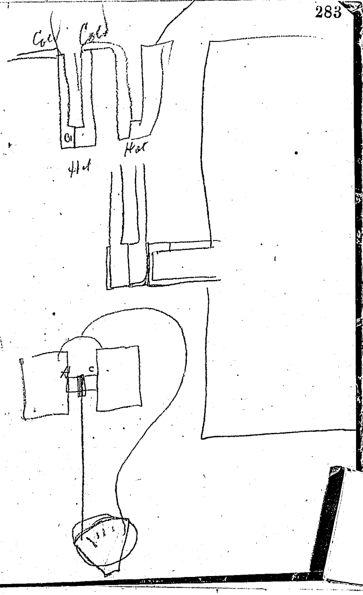
12
12) 7400 (60

125
60
2240) 7500
6720 (3


Cold
Zn
Hot
Zn


CuO Hi
Expansion or
lessened Condensation
O Zn
Condensation


Hot
Cold
Cu
Cu
Fe


Cold
Cold
Hot
Hot
A
C

1 mill 1 ft 1 ohm

1/16 — . $\frac{1}{60}$ ohm

~~2/30~~ $\frac{1}{100}$

10/100 — $\frac{1}{5}$

$\frac{12}{16}$

$\frac{72}{12}$

10/1000 1 $\frac{1}{192}$ -

10/1000 1 ohm

10.000 -

1/8 inch 1/1000 ohm

$\frac{1}{8}$ thick - $\frac{1}{64000}$ ohm

2" sq $\frac{1}{16}$ thick

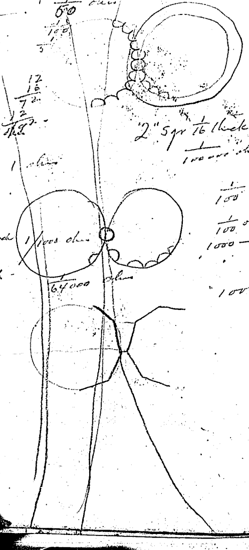
$\frac{1}{100000}$ ohm

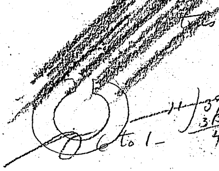
$\frac{1}{100}$ volt.

$\frac{1}{100}$ ohm 1 volt

1000 — $\frac{10}{1000}$

"1000 -





…s for 5 bbls -

$$11\overline{)375}(34c$$

75

33

45

6 to 1 -

12 to 1

180 lbs

$$180\overline{)2000}(11.$$

180

200

13000 times Hg

80

1040000

Notebook, N-87-03-02

This notebook covers the period March 1887. All entries are by Edison. The book contains notes and drawings about his magnocaloric motor, which John Ott was making. There are 288 numbered pages.

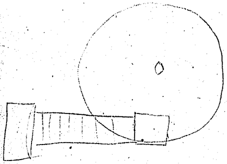
Blank pages not filmed: 1-3, 52-288.

Missing page numbers: 11-12, 31-36.

March 2 1887

At last John Ott starts to make TAE Magnocaloric Motor.

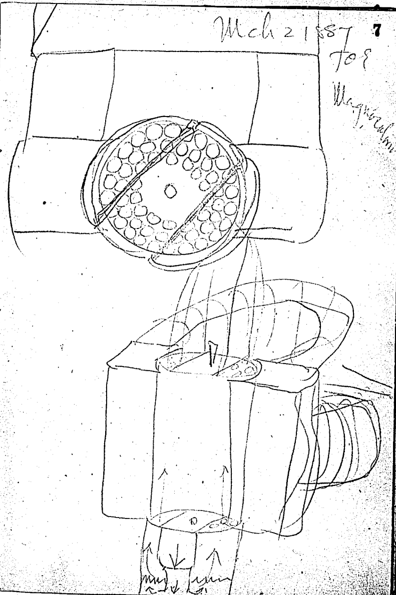
Simple fundamental —

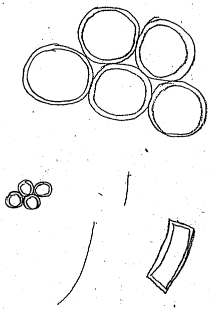


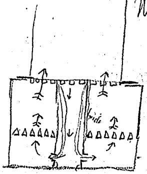
Mch 2 1887

TAE

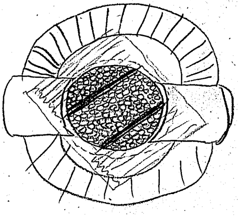
Magnetism

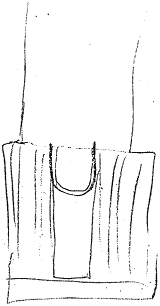






Mch 2 1887
TAE
Magculerie

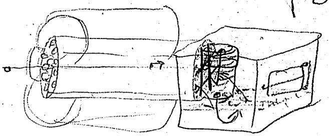


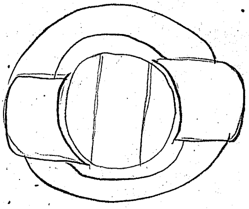


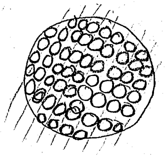
Magnocaloric Motor

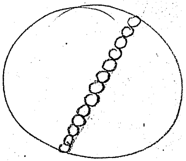
Mch 3 1887

TAE



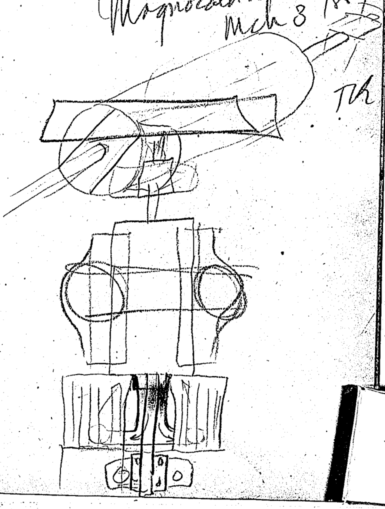




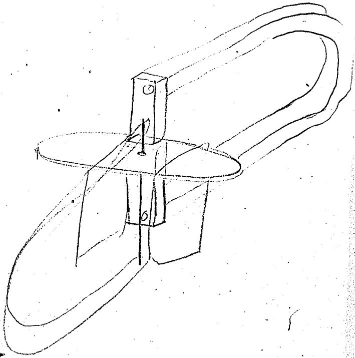


Magnocaloric Motor
March 3 1887
TAE

Magnocaloric
Mch 8 1887

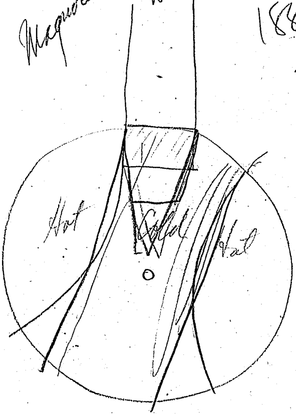


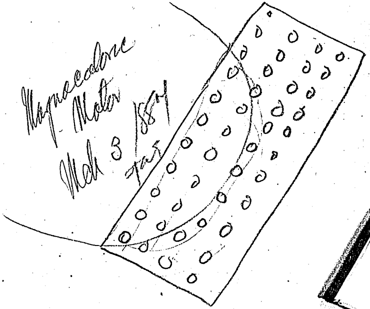
TAE



Magnoelectric Mch 3 1887

TAE

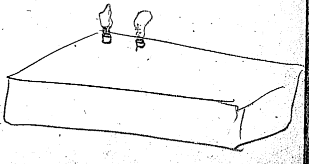




Magnecalore Motor

Mch 3 1884

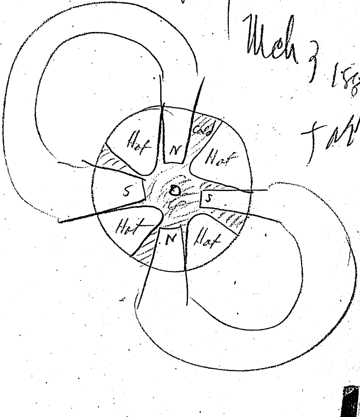
TAE



Magnacaloric

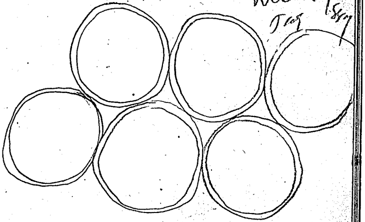
Mch 3 1887

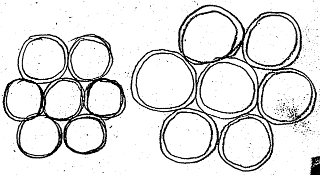
TAE



Magnocaloric

Mch 3 1887
Tag





Mina Miller Miller

Mina Miller Edison

Mina Mine, eh!

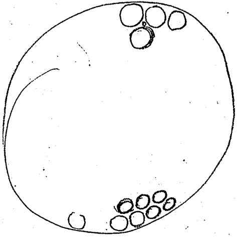
Mill-her

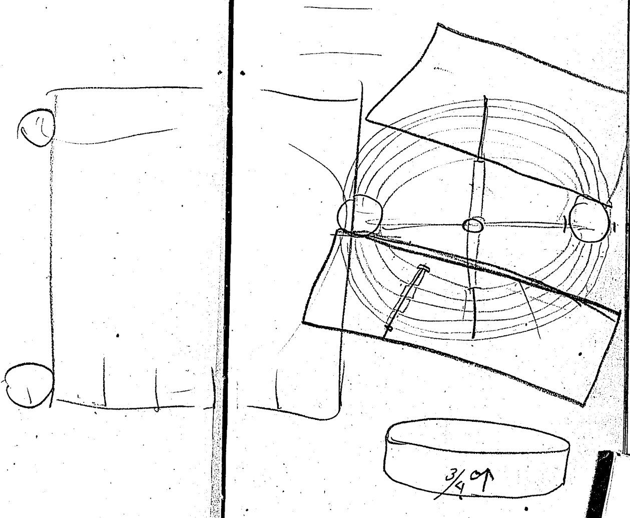
Ed is Son

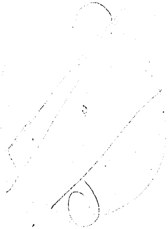
[illegible]

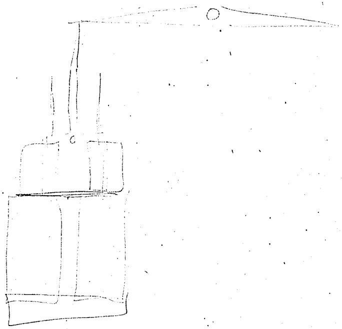
Mina Mina Mina Mina

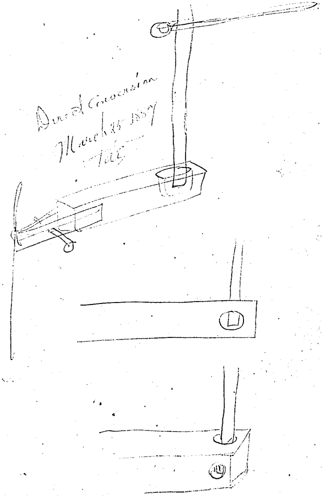
A prime motor consisting of a moving magnetic body




3/4 o↑





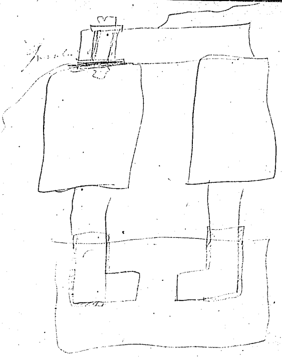


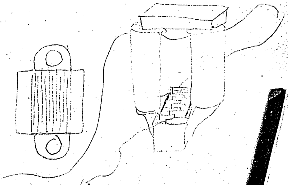
Direct Connection
March 28 1887
TAE

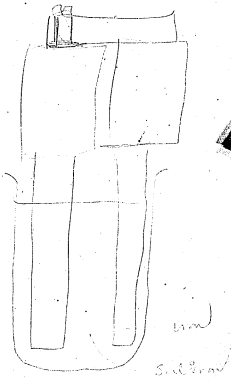
Young

[illegible]

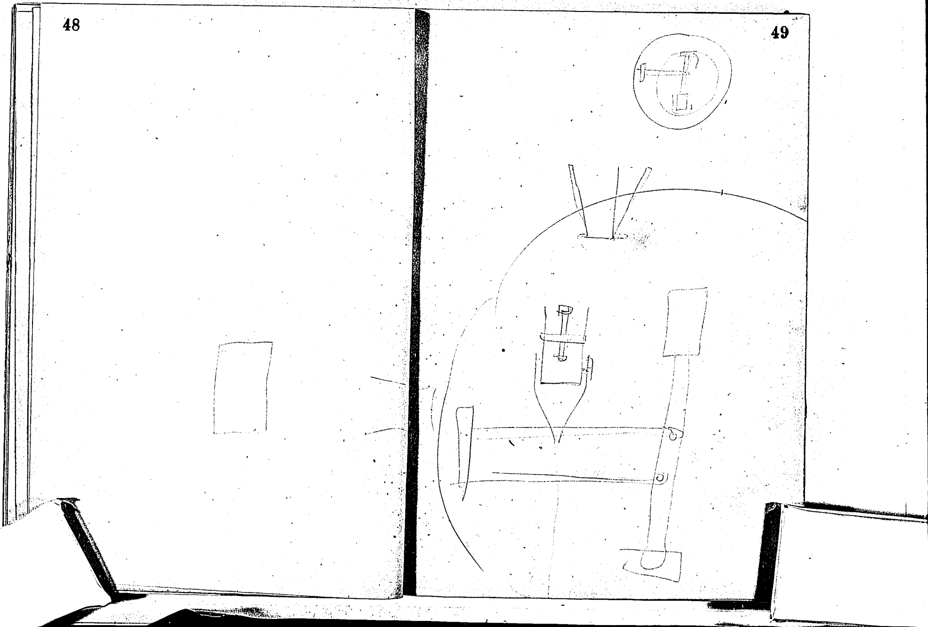
Frangapanni







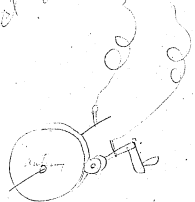
heat it –
get thermo currents
reverse polarity of field
time to time keep
the rods same size



48

49

Direct Conversion



antenna wheel

or Copper & Iron -
heat the Copper (1e) use
small Cop roller kept
red hot & rotate

Notebook, N-87-04-00

This undated notebook is a continuation of N-87-03-00. It was used by Edison for notes on squirted filament experiments, nos. 167-207. There is also a 3-page list of fluorescent materials. The pages are unnumbered. Approximately 90 pages have been used.

167 =

We had 4 lots of these

167 Burned 4 dia
167 Top - 4 $\frac{1}{4}$

167 $\frac{1}{2}$ Top 3. $\frac{1}{2}$
167 $\frac{1}{2}$ Burned 3-3/4

---

3 Hour OK Splendid

167

Before Cbz 6 $\frac{1}{4}$/1000
after " 4 = Burned
4 $\frac{1}{4}$ & 3 $\frac{1}{2}$
another 67 by 3 3/4.

6 grammes Carbonite.

10 cc of the Lukewarm alcohol (wood) al with excess of ~~acetate alumina~~ for 12 hours —

The 10 cc precipated by Ammonia and Then filtered & washed with Alcohol, When jelly like transferred to beaker & alcohol added

Enough to wet the Carbonite
Mushy — ground well in
Mortar till yellow powder —
then put in Water Oven
and dried 1/2 hour —
Then set aside in dish for
3 or 4 hours (Covered)
waiting for Freddy to
get a new 5000 die made —
I add 1.600 Miligrammes
Camphor in enough Ether To
Thoroughly wet the Carbonite
but grind the Carbonite

a little finer to break up lumps made in drying -

Squirts perfect - low heat, fils perfect, very seldom a spec, round & even, by not having heat constant it got too high or too low at times and the fil puffed slightly or surface wasn't shiny when heat too low Could the heat on die be kept constant this fil Comely spkg would be an ideal one to make, no trouble at all — but the heat must be regulated just to get a good shine & kept there — Very little puff in spoon in fact fine —

Big Clz 167 = Little dirty but good — those that were puffed originally are still puffed = The ash keeps round & goes down to 1/3 original size and in quantity is at least twice if not more than in 132 = End are good —

168

Is same as 167. except.
2.500 of Napthalin
disolved in warm gasolene
The small beaker 3/4 full of
gasolene will not disolve
2 1/2 gms of Napthaline so I
warmed it, When I got
it nearly to drying I noticed
glistening particles of
Napthalin, Got it dry so
smell of gasolene gone
when it become very Electrical

and it was difficult to powder, We found on putting in die that very little heat was required which was contrary to 136, but it took considerable heat to get the shine, & then two things occurred, Crystals of Napthalin showed on filament, & the fils taken & laid on paper warped all up = also preciousare get in die & cut the film in thin shreads

We then took the fils already made & balance of the ingot & repowdered, but on squirting again there was still too much Napthalin, We then squirted the whole ingot into fils & repowdered & dried in oven, on trying it again we couldnt get a shine even with great heat, fils were round but no shine & we even

increased heat so there
was a slight puff
noticed The first fils
made I tried in spoon
they swell even less
than 167 and have
fine shine — With the
proper portion of Nap.
they will be very fine —
I think about, 1.500.
for 6 grms of Carbonite &
well dried after gasolene
in will do the business

169 - ~~stuck~~ 3 Hrs OK not ~~sh~~ very shiny
after Clzn Top 4
Burned 4½

6 grms Cbt

10 cc Magnesia Sol -

worked same as 167.

to 1/2 of it put 750. Milgrms Napthalin, by mistake used amount gasolene Enough for 6 grms took Considerable while to get dry + when only fairly dry it got so electrical couldnt powder it any further, took powder out having faint smell gasolene & put on paper & held over flame 2 or 3 times stirring it—

squirts OK but no amount of heat gives a shine — if too much heat puffs without any shine we got a few that we

may be able to Cbze
some are slightly puffd
other ok but poor
surface —

170 —

3 Hours Elegant -
slight tendency stick together
but this pbly due to be all in
a bundle they all
separate however

2nd 1/2 of 169 — [illegible] top

800 Mlgms Salol.
(Salicylate of phenol) in
Mal — next time try Ether

Works nice in mortar can get to very
fine powder, & I do not think
it very Volatile, dont stick
to mortar — squirts fine
fils good Even but shine
not perfect, if try get it
perfect slightly puffs

If it shines in CBz,
it would be a very nice
fel to work in dic

perhaps it needed 1.000.
of Salol – it don't puff much
in spoon it splits open

171 — 3 Hrs fine, shows tendency
stick, some pieces charcoal
stick to them but guess
will come OK

Same as 167 - 1/2 part of 6
or 3 grm

Except, 800 mg Betal (Naphthol)
in Ether - works fairly well in
mortar towards end inclined be
Electrical, also stix to mortar
(1e) friction, its not extra dal in
Ether so had use Excess,
it creeps in beaker + evaporates
and which gives some trouble
but altogether it would be
worked OK = squints perfect
film very shiny - Even, very
few specs - dot marked X
171 got little too much

heat + there is puff blisters on them. with good regulation of heat Metal is fine file tough, + extremely even —.

Note, in annealing 172 our next file we found by using low heat + giving time, the shine came ok + there was no danger of puff blisters

172. 3 Hrs splendid

1/2 of 6 gms

Same as 167

Except used 800 mg

Trichlorophenol in Ether

works well in mortar,

& quickly - to powder,

dont stick to mortar

finest yet to work in Mortar

— Cannot get powder

very fine as it probly balls

slightly together Trichl Benz

an extra good solvent

of it —

Spots perfect, polish
perfect Even no puffs
Except perhaps last batch
May have some fine blisters
Even - dont puff much in
spoon — Elegant —
used low heat (jets 1/8) +
gave it time —

3 Hours OK not extra shiny
no sticky

173 —

1/2 of 6 grms

6 Cbt

Before Cby 5 3/4/1000
after TOP 3 3/4 B 4

40 cc of Cold Saturated Sol 6 hours of Alum precip by ammonia Water washed then Wood alcohol — worked to powder & dried bath, 1/2 taken; & well ground —

~~1 Mg Camphor in Ether.~~

one grain Camphor in Ether,

Works fairly well in mortar
powder isnt fine as Camphor
has tendency ball —
use low heat but give it
time,
Had heat too low -
wanted more heat than
we gave it, but film
shiny good ~~p~~ but
its not a perfect mixture
to work. but had we
the proper heat it wold
have pbly gone OK —

3HClz - stuck together, puffed little

174 = Dont think they could be separated in practice, possibly by very slow preliming might get them ok

Same as 173 —

Except 1 gram Betol — in Ether - I ground the Cbt (before putting in Ether) finer than usual —

Squibbed perfect but fils melt in flame & this is pbly due to the extra fine powdering as when we powder fine we permit more Betol to penetrate

the particles, This would
go to show that either
less Betal or other
solvent must be used
or the acid can be
increased very much
the [illegible] good product

They will not Carbonize
undoubtedly

Betal I think make a
Chem Reaction to make
Cbt melt, Camphor or
20cc Mag ground Ex fine
don't do it - don't puff
in flam

Or Confirms with Trihydrate all
+ Cbt

175 Top - after Big C bzn -

Not mirror like, fair - spec dust on them - got nearly all didn't stick no puff -
The die was originally bad -
[illegible] again very slow

175 - OK - 3 Hour Cbz Elegant but surface not extra shiny

Before Cbzn 6 3/4
after Top 4 1/2
Band 4 1/2

~~Same as 16~~
6 Cbt

20 cc of Lukewarm Al Sol Acetate Mag - pp by ammonia, washed al-
divided this in 2 parts this is first part, putting ~~[illegible]~~ 750 mlgms Camphor in Ether ~~grinding~~ and grinding the stuff finer than usual like 174 — squirts fine

fils not Extra Shiny But
shiny - spots perfect,
no specs Even nice
it dont act at all
like Betol, hardly any
puff or flame -
Evidently Betol makes
new chem of Cbt, while
Camphor is a solvent,
Evidently grinding this
number finer helped to
get better fil with 750

Camphor clean if it hadn't
been fine - - in spotting).
heat shld be regulated
so not get blisters, a
few of figs have slight
blisters, —

176 = 3 Hours OK - surface not Extra shiny

2nd pt, 3 grms

Same as 175 but with

750 Betol in Ether —

Stuff ground fine -

before Betol put in —

This will prove if Betol

Combines with the Cbt

or the Trihydrate of Alumina

to make fils melt,

Spots perfect shine better

than 175 - good

Very few flaws - Even
puffs very little in flame
this shows that it
was the trihyd of alumin
that made Boral melt
the fils —

177

3 Hours NG - puffed stick togther some but not so awful - ½ the NHCl. would pbly prevent puff -

6 Cbt

~~& some hyd[illegible] of~~

~~what [illegible] to be~~

750 mlg of Chloride of Ammonia dissolved in alcohol & then precipitated by pouring into Ether then filtered & washed with Ether, then the pulp stirred up in Ether & poured on 6 Cbt & worked in

usual way by grinding
& drying in Water
bath— This No is 1/2
of the batch (1E) 3
grms — I used 800
mlg Camphor in Ether Stuff
~~ground fine before putting in~~
Camphor —

Squirts fine but the Chl Am
Crystlizes out in 1/10000 crystals
these crystals are embedded.
in the surface of the

film & makes it rough
in the spoon the films
swell up 2 or three times
their diameter. then in
full heat in spoon
diminish in size —
dont think can carb
them, ~~they~~

End on shows crystals
rough not shiny —
We shall not need the
2nd part =

3 Hors OK - but surface dull not shiny - perhaps I got some that were not originally shiny

6 Clf -

I made what I suppose is Fluoride of Lime by [illegible] putting a solution of Chl Calcm in Fluoride Soda & then adding Ammonia to make it Alkaline, it gave an exceedingly fine precipitate like Magnesia & it was 2 days falling

I took of the dope
about equal bulk
to that given by
10cc magnesia solution
I divide it in 2 pts
this No is 1st part,

---

fils squirt perfect round.
byte drag crax until heat
gets very high then it
squirts perfect, shiny
& very free of flaws

~~Hy~~ but towards end
Camphor or something got
wrong & we only got
2 fingers full—
The Ash is altogether
too much there must
be twice & if not 3 times
as much ash as in any
fil so far, in spoon)
it dont puff at all,
They will Carbonize perfect
The 2nd lot I am going
to put ~~1 gram Camp~~
800 mg Belal

~~179~~

~~I am Co[illegible]~~

~~afraid to use Betal~~

~~for fear of some reaction~~

~~with the fluoride~~ –

~~2nd part of~~ 178

~~179~~

800 mg Betal,

squirt fine foils shiny not extra shiny but fairly shiny – Betal is better than Camphor as a regular solvent – the same weight will make generally a more shiny filament & it puffs no more than Camphor

179 = Bttons OK surface not shiny.
die streaks

2nd 1/2 of 178 Before Clgn 7½
after (Burned) 5¼

~~+ [illegible] Camphor~~

800 mg Betal, in Ether -
squirts good film more shiny
than Camphor in fact for
equal weights, Betal gives
more shiny film & puffs no
more - there was a slight
tendency to crinkle &
Betal requires a much
lower heat than equal
weights Camphor -
Dont puff on ~~[illegible]~~
spoon

after Big Cbzn

179= Lots of specs outside, think its fluoride, tho it may be the stickiness of fluoride coming out that attracts flying particles on oxdtn in spoon ~~[illegible]~~ shows immense amount of fluoride or lime, holds shape of filament, = separate good — when buried in sawdust there will be no trouble about sticking of the filament,

Shows not narrow — the die was sticky & not smooth, What depends on good die & probably less fluoride = fil put right in flame, the dim shrinks to 1/2 the diameter & keeps round —

180 — 3 Hours splendid — shine perfect all perfect,

Before Cbzn 6
after Top 4
B — 3 3/4.

.6 Cbt 1st 1/2

20 cc of Alum Solution

pp by Ammonia —

750 Camphor —

Squirts perfect fils perfect, Even no flaws, perfect shine but puff great deal in spoon fear they will not Carbonize wants about, 450 Camphor in 2nd half —

Big Cbz = Buried fils — all stuck together Couldnt separate any — fils are beautiful — Mirrors all it wants is Ventilation to bring them out perfect — Dont puff in the slightest degree — oxidizes very slowly in spoon & down to spider web & very even in diameter. But surface while shiny is microhilly — no puff spots.

181.

2nd part of 177

I am going to use 800 Camphor in Alcohol instead of Ether to see if I cant get rid of the Crystals of Chl ammonia/

ng - water in it brittle

ng

3 Hours OK = surface not X ohm

182

2nd 1/2 of 180 —

450 mg Camphor —
Before Cbzn $6\frac{1}{4}$
after B 4
also $3\frac{3}{4}$
Top 4

Splendid fils all round but they puff bad — spoon dont think they will cbz 200 mlg wld do better, Evidently there wasnt enough Alumina —

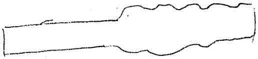
182 Top —

Big Cbz = got nearly all of fils — Clean no spots on them — mirror like — no puffs — Cbzn in spoon very slow —

20 cc of Magnesia Sal
gave 465 mg dried Hydrate

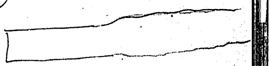
164 =

Test in small furnace in Carbon boxes nothing on file. 3 degs minute, 300 degrees puffs some in spoon



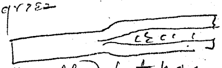
brittle,

400 degrees puff very little in spoon



Tough to handle

500 degrees



Surface not puffed but has

nearly ~~the or~~ slightly softened
original surface, but split open
shewing center not cbzd —
Very tough =
fils brot to 500 degrees
can be handled roughly are
shiny tough & can be bunched)
without fear of Sticking -

Contraction at 300: $6\frac{1}{4}$ to
$5\frac{1}{2}$ — at 400 deg
$6\frac{1}{4}$ to $5\frac{1}{3}$ — 500 deg
$6\frac{1}{4}$ to $5\ 2/10$ — Thus
between 0 & 300 Camphor etc
Contraction, between 300 & 400.
Little Contraction bet 400 &
500 probably Carbt Contraction
500 is Evidently the point

for preliminary to step —

600 degrees = when we
took box out I saw the fils
creeping + moving when
examined under micro.
they were all contracted
split + broken in every
manner — now were they
expanded or contracted or
was it the sudden cooling

3 Cbt. put in water bath ½ hour — 600 Camphor in Ether — gets Elec a little towards end — used gets about ½ high — had warm moved to ~~Start~~ with but no steam — Kept ½ heat on all time, but shine not mirror — no blisters got two fingers & one small finger towards End was shiny because

Freddy put steam on, but there were blisters, yet it was shiny - squirted hard - probability is that there is not enough Camphi think the next with 800 will be about right, (400 was bad) -

184 =

3 C6t. in water bath
1/2 hour. 800 Cam in
Ether -

Squirts fine - but surface
while shiny isn't mirror
like ingot fils - no blisters
3. fingers — of which 2
are good - surface shows
microripples

185 –

3 cbt

1000 Camp

11 cc Ether

Squirts fine, but cant get mirror, there is the [illegible] surface. 3 fingers –

186

Duplicate of 184
with more polished die.

This work fine = mirror
no puff - very faint blisters
on first lot =
This shows the die that
gives mirror. at least it
helps hence 183 · 4+5
~~will~~ have rough surface
after Cbzn —

187 =

Dup of 185 –
but with better polished
die,
They are not mirror like
like 186 – showing that
186 took the polish off
the die –
squirts fine fills fine
but not mirror
no blisters,

188-

3 C6t- 1200 Cam 10 cc Ether

using same die as 187-

squirts perfect, we found Contraction rough & put in a more polished one perhaps this helped. fil. Mirror, slight blisters at times, squirt perfect,

3 Cbt
600 Betol — final powder
not fine —

perfect Mirror fils —
no puff but faint blisters
on last finger full —
8 pts fine — puff terribly
in flame —

Note, the Drip of 167.
Run up to 500, at rate of
3 deg minute open in box
laid on Asbestos, held at
500, for 6 hours came
out shiny fine — tough —
when put in spoon right
in flame split open a little
& stuff puffed out, in sand
stood should say 800
~~without~~ splitting but
after this put the spoon
right in flame when they
split just as bad as if
they had been put in flame
in first place —

190

3 Cbt

400 Trichlorophenol - in Ether

Squirts perfect, Mirror, one finger blistered other 2 ok - Very sensitive to heat, use 1/16 inch jet give it time - fill melt in spoon

Think 300 will be better

Note
perhaps I didnt get all the Ether out, or there may be a reaction while in press that makes a volatile acid which accounts for blisters at low heat. Next number will make in powder dryer —

191

3 cbt

300 Trichlorophenol in Ether

worked this dryer than 190
so dry it was disagreeably
Electrical in Making

Squirts good - fairly shiny
had nice ½ inch jets +
then went very hard -
no blisters, but some
specs = Evidently didnt
have 190 dry enough -

192

Duplicate of 191
with more heat on the die
and powder just as dry
if not dryer —

193 -

3 Cbt - better purified
750 Napthalin in Gasolene
put in & worked to dry powder
then 400 Trichlorophenol in
Ether put in & worked to
powder —

Squee[illegible] sifted, shine
good & even no puff —
Nothing could be better to
work than this yet
Cbzd OK =

~~124~~ -

3 Cbt
400 Trichlorophenol
750 Paraffin both dis
in Ether – The paraffin
only partially dissolved)
Considerable was powder
pred at [illegible] [illegible] [illegible]
to powder – very clogging
in die –

Doesn't work at all

~~194~~=

3 Cbt
1 No 20 -
500 Trichlphenol in Ether

Cbt + 20 ground well togeth
then Trichl solution put in
& worked to powder -

No [illegible]

194 —

3 Cbt
500 Trichlorophenol Ether
750 Naphthalin gasoline —

Nap first —

Had it in press all over
Sunday — Monday started
with 004 saphire jewel die
difficult again on account
bad shape Die — squirted
a few not [illegible] —

195 no test,

3 cbt baked.
2 grms Napthalene in Ether
with [illegible] mg Trichlphenol

---

19 no test,

3 Cbt
400 Trichlophenol Ethr
750 Nap in Gasolene

squirts fair - lumps
+ specs - not extra

Okay

197 =

Same as 196 Except both Trickl + Nap in Ether – not extra Oblong + long Crinkles

3 cbt,
400 trichlorphenol
500 napthalin

2 grms to [illegible]

179 = Cbt not gasolened but ground in Mortar -

3 Cbt
400 Trichlorphenol
700 - Naphthalin

New Box [illegible] no cutting
New press [illegible] 3/16 -
works only fair stuck
2 or 3 times feeds have
spaces =

200 —

Cbt gasolened,

3 cbt. tried but guess I didnt dry it enough before weighing hence short weight [illegible] only 2 grms

300 Nickelo flake
500 n of that

Segments perfect not a break of its perfect mirror but slight puff spot. it only took ½ of the Doze. the other is ground fine & well spunt it as No 201

201 -

other half of 200
but ground finer after
V dp + Mich putting
to see if opens are
due to Ether inside
particles -

This didnt grind well at all
took lots heat & not
good surface showing
that 200 was a little
damp & that whats made
it go — WE shall now
use a liquid in

place of trichlorophe

⑩ Cressylic acid

P02

3 cbt gasolened +
Heated in bath before
weighing —

300 milligrammes of
Cressylic acid —

750 milgms Napthalin,

Didnt powder it very fine
powder while apparently
Dry like could be flaked
in motor - squirted
perfect, shine fine Even fils
but puff specs + occasionally
surface drag flaws - if we used
Vacuum might making press think
fils will be

practically perfect as the specs are nothing but air bubbles under pressure & being released as film becomes press puff outwardly while film is hot. The previous formation of an ingot in vacuo & with heat & squirt it will remove this difficulty

203 is other half of 202 = powder was put in press plunger put in about 1/2 of what it would be to make powder solid, boiling water heat only kept on 2 minutes with idea of vapor of Cresylic a driving out air — then plunger put down & squirted squirts perfect, specs very small. best film yet with plenty heat

fils went to mirror
without ~~[illegible]~~ puffing
specs fine & few in number
flaws scarce but fil
yet showed allow 50.
mg extra (ie) 350 mg
of Cresylic & water heat
for 5 minutes to displace
all the air, think flaws
are due to air as well
causing fil to be thrown
sidewise by its expansion
at moment coming out.

204 –

3 cbt gasolened & dried
before weighing –

350 Cresylic acid }
750 Napthalen } Ether.

Put powder in press &
lights 1/8 high & hot water
in jacket, with plunger
only in 1/2 inch. 10 minutes
at end 5 minutes commenced
run plunger down gradually
in 13 minutes it had
reached & consolidated
ingot & fil came
Perfect except very fine
specs, either due to

residual air or lumps
think its air gone
Try Vacuum —

205

1/3 of

3 C&t gasolened + dried before
weighing
350 mg Cresylic acid
750 Napthalin

Works perfect most perfect
shine yet no puffs.—
specs microscopic + few
used Vacuum, powder very
put in plunger put on 1/2 inch
+ heat put on Vac, while
Vac after 5 minutes a
Ran in plunger to solid
ingot.

made 205 then [illegible] of
205 with [illegible] - all [illegible]
perfect but some have specs.
some are narrow up in spots
[illegible] too [illegible] too much [illegible]

206 —

3 cut - gasoline [illegible]
before weighing
200 mg Cresylic acid
750 Naphthalene
Vac.

[illegible] ok but there are
narrowing places & specs
& not extra shiny but
films are fair as far as can
see the lights being shut
off Saturday p.m. —

207 =

3 cbt
200 mg Cresylic
730 Nap
Agate 004 Die —
didnt wk good
Rough fils small —

5400—
700
6100

5)3500
7

200—
1800—
1200—
420
900
900
5420

30

100

10
30
300—

10
20
200

600

1000
7
7000

5 20000

Silver Benzoate

Diphenylamine Sulphate

~~Lithium~~ Sodium Benzoate

Barium Benzene Sulphate

Sodium Anthranilate

Lead Salicylate

Uranium Borate

Silver & Sodium Chloride

Platinum & Ammonium Cyanide

Gold & Sodium Cyanide

Platinum & Potassium Lithium Cyanide

Platinum & Strontium Cyanide

Fluoresces more mildly –

Bismuth & Sodium Salicylate
Lead Sulfo Carbolate ✓
Ammonia Mellitate ✓
Lead Benzoate ✓
Potash Chromo-Salicylate
acid mono-Chromo Benzoic para
Cinchonidin di hydro Brom.
Sodium Chlor Hydro phosphate.
Lead Sulfo Cyanate ✓
Lead Tungstate.
✓ Calcium Silico fluoride. Barium Benzoate ✓
✓ Sodium Sulphanilate – Sodium Sulfo Carbolate ✓
✓ Mercury Urate. acid Quinoline sulfonic para ✓
Caffein Hydrochlorate. Mercurous Benzoate ✓
✓ Sodium para Cresolate, Sodium Anisate ✓
Cinchonidine hydro-Iodide ✓
Bismuth & Sodium Benzoate. Zinc & Manganese Chloride
Ethyl & succinyl Succinate. acid mono Iodo Salicylate
Uranium & Ammonium Carbonate ✓
Potass Sulfo Benzoate.
Potassium Benzine disulphonate.
~~acen~~ Acenaphthene

OVER ✓

Fluorescers from Last lot
Mercks Chemicals –

Good –

✓ Sodium Napthylamine Sulphonate –

Lithium & Sodium Salicylate
Sodium Sulpho-salicylate
Cadmium Salicylate ✓
✓ Uranium & Calcium phosphate
✓ Zinc & Potassium Cyanide
✓ Copper & " "
✓ Uranium Oxychloride
~ Platinum & Calcium Cyanide
✓ " & ammonium "
✓ " " Cerium "
✓ " & Potassium Sodium "

No 1 Box 167 – one lot buried one lot exposed on top —

No 2 – 167 – Two lots both buried –

No 3. 170 – one lot buried one exposed

No 4 171 – Two lots buried one exposed

No 5 172 2 lots buried one lot Exposed

No 6 173. 2 lots buried one lot Exposed

No 7 174 – not buried but exposed

No 8 175 2 buried on top –

No 9 176 – two buried one top

No 10 – 179 buried large pile – small on top

No 11 180 – 2 buried 1 top

No 12 182 – 2 buried 1 top

No. 13 – 169 buried –

No 14 164 2nd half buried –

No – 15 167 – all on top –

No 16 – 167 – buried

167 No 1
168 — none
169 No 2
170 — No 13 -
171 - No 14
172 No 15
173 No 16
174 — No 9 -
175 No 10.
176 No 11
177 No 12
178 — No 5 -
179 — No 6
180. No 7.
181 — none —
182 - No 8

in 3+4 some 167 were placed with nothing on them — ⑫ no sawdust

No 3+4 3 Hour Cbz Splendid shine mirror.

167 6 100
168 3 80
180 (880 (
5
169 5) 35 35
170 70 85 (350 (3
171 3,5
35
172 175
173 105 3.
1,2,25
100) 800 (8

3
70
2,10

2) 35
1,8.

5
80
1 3,5 1,180 (800 (4

5 5
40 6 80 25
20 80
200 30 1600 2000

100
25
500
200
2500

Notebook, N-87-09-02

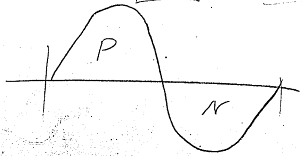
This notebook covers the period September 1887-October 1889. All entries are by Edison. The book contains drawings and occasional calculations relating to the electric railway, dynamos, and 3- and 4-wire electrical distribution systems. In addition, there are drawings and patent caveats for the phonograph, typewriter, and spiral kinetoscope. There is also a list of cost calculations for an ore milling system. The book contains 245 numbered pages and has been used in both directions. Two loose pages have been inserted into the book.

Filming order: 1-149, 245-154; loose items.

Blank pages not filmed: 8-9, 16-19, 112-115, 126-133, 138-141, 144-145, 150-153, 156-159.

x E-172

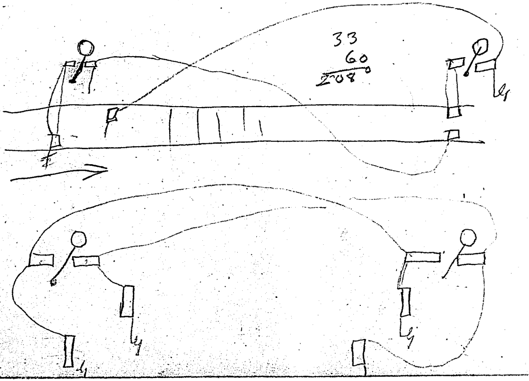
N-870002

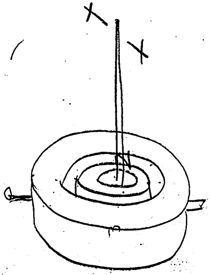


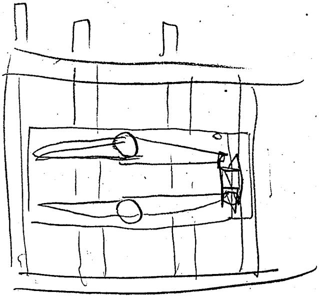
15.

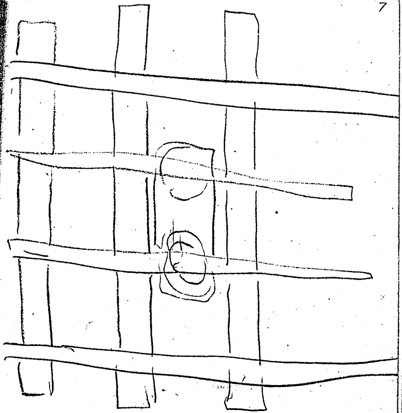
150
15
7.50
15.0
22.5

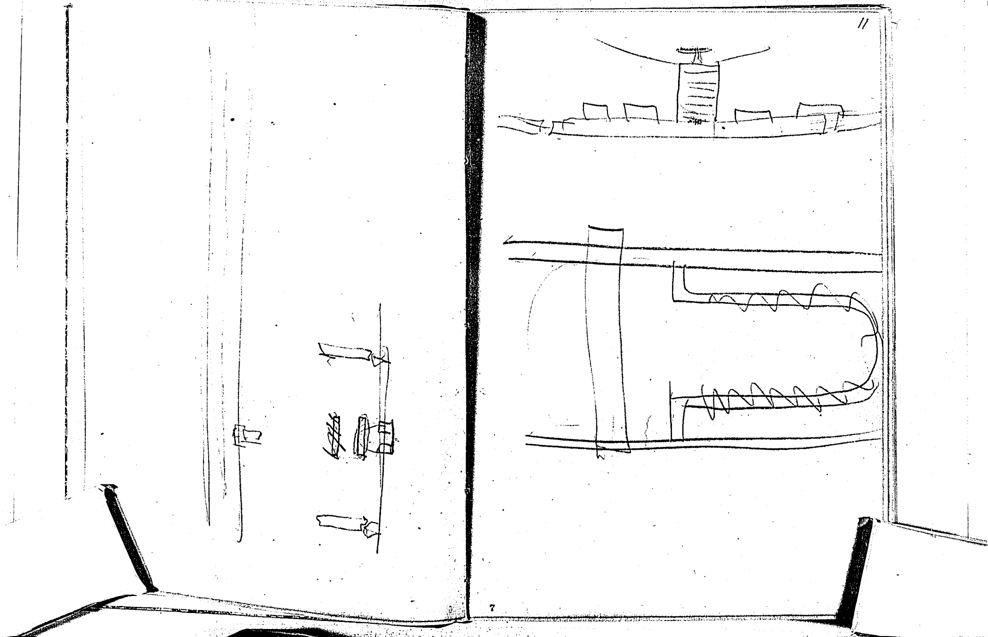
33
60
208

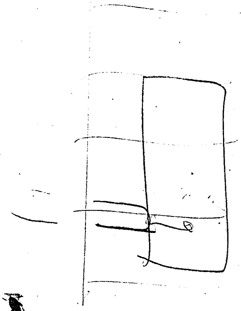


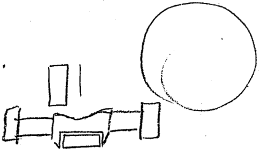


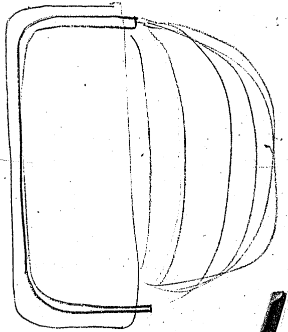


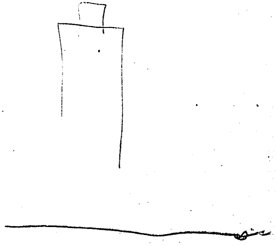


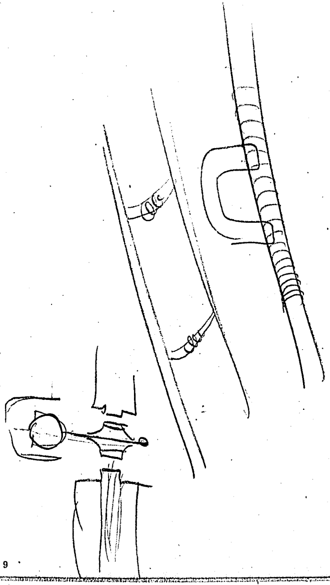

11
7

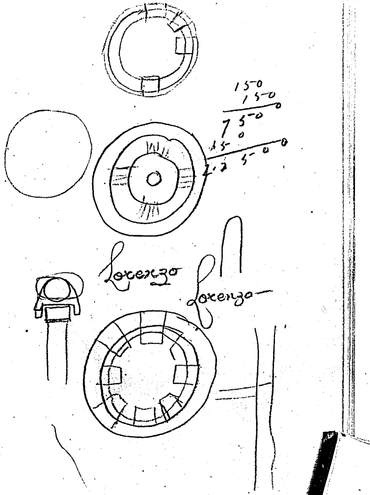




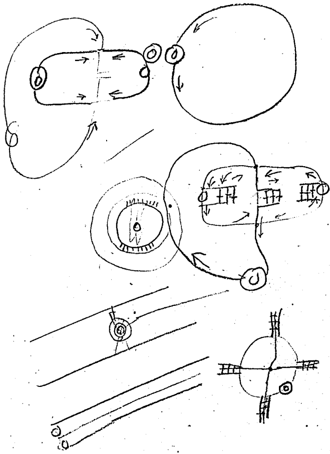


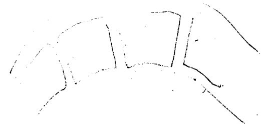


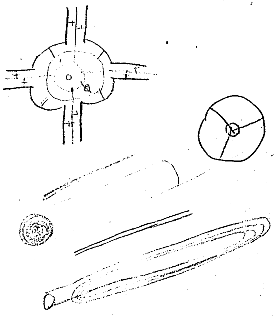


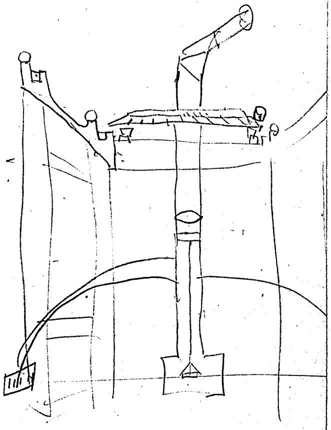


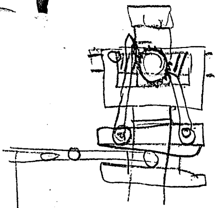
15-0
15-0
75-0
0
15-
2.25-0-0

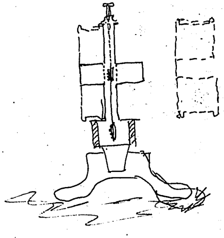




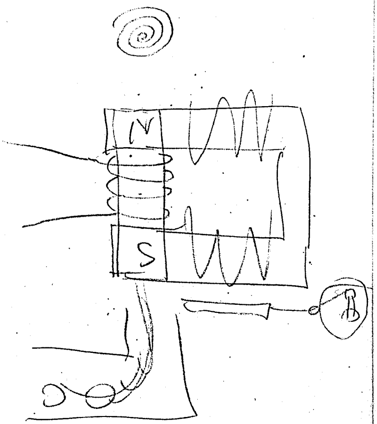


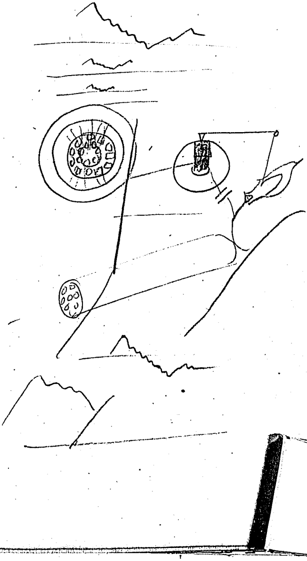


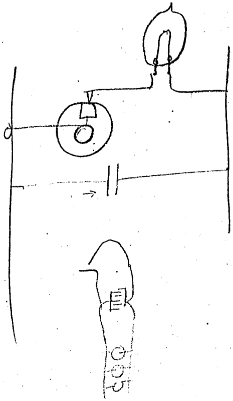




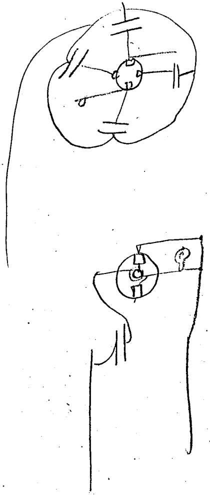
240
1 2
2 0
0
2 4 4
0
9 6 0
0
6 6 2
959
4

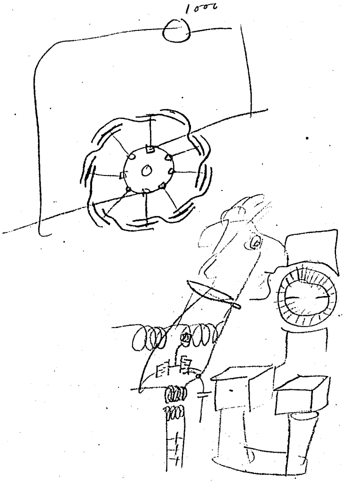

N
S
B

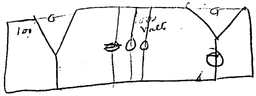


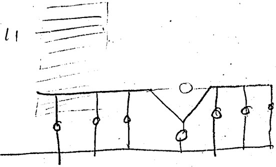


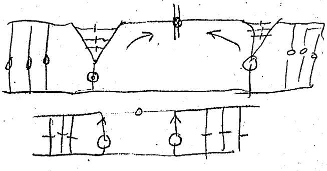
سیخ

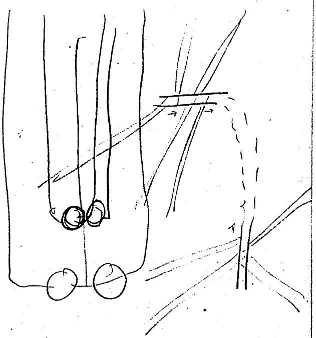


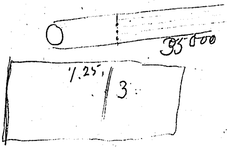

1000

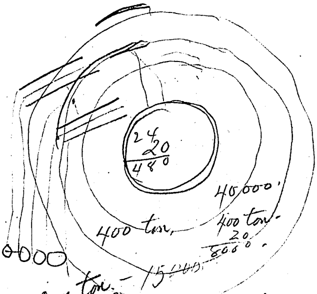

100
1500 Volts


11





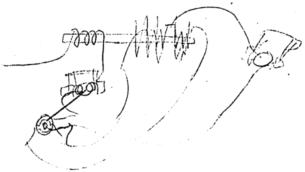

35000
1.25
3

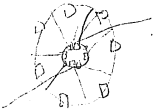


200 ton – 15
400 – 2

15 – 15000 1000 amp
60000 6000 lbs 2 miles

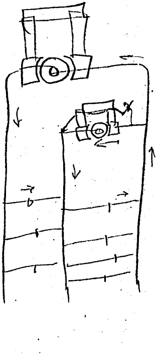
2500 Volts – 25 – 12 – 6000
24 12000
48 24000
2 miles, 24000 lbs
$12000 – 24000 12 –

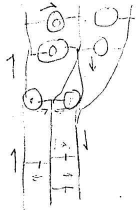


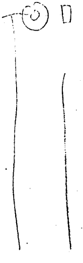


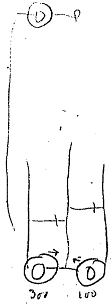
Oct 5 1889

new 3 wire system



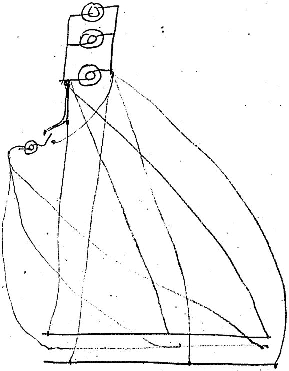


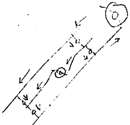


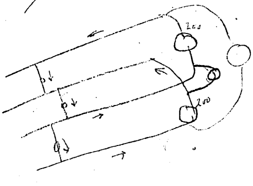


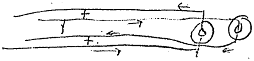
Oct 5 1889

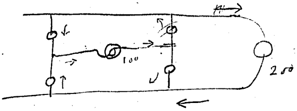
new 3 wire system

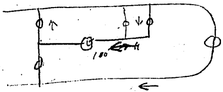


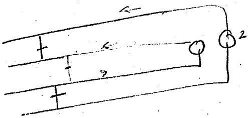


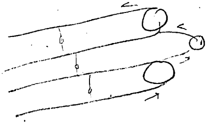

200
200

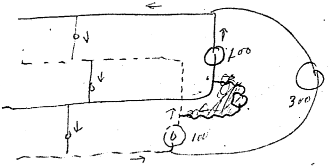


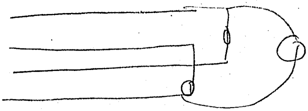

100
200

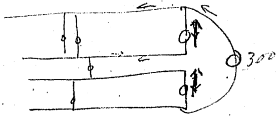

100


200





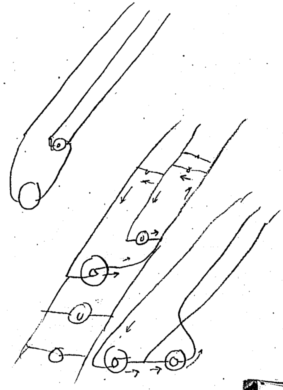


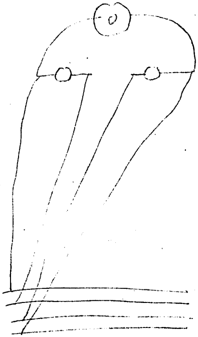

300

1'

5 units.

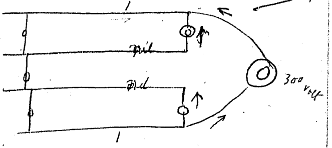
$\frac{14}{98}$

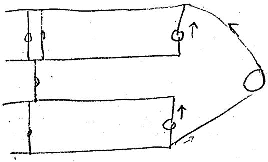




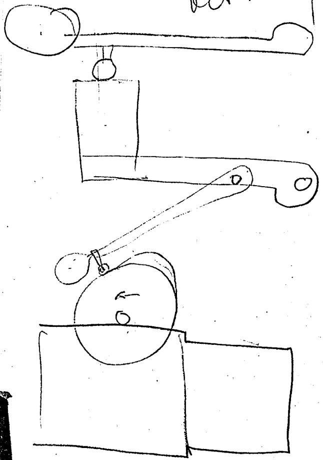
New 4 wire System Oct 5 1889

TAE

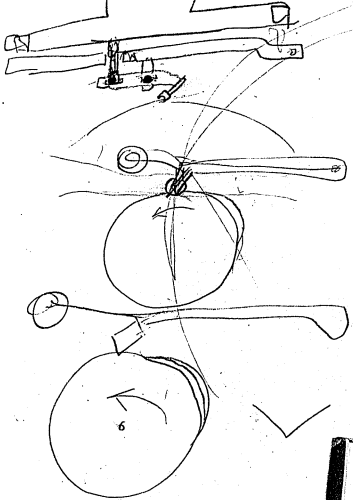


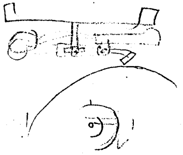


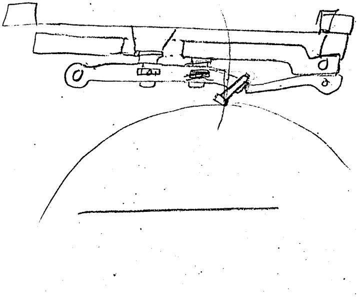
Phonogh
Oct 10 1889

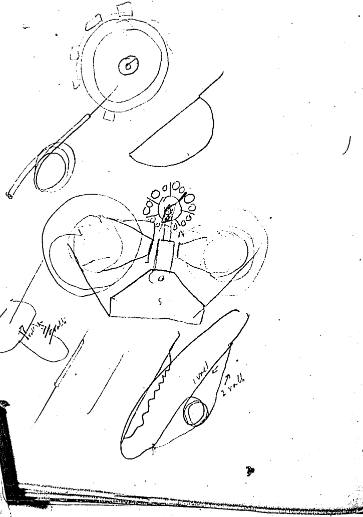


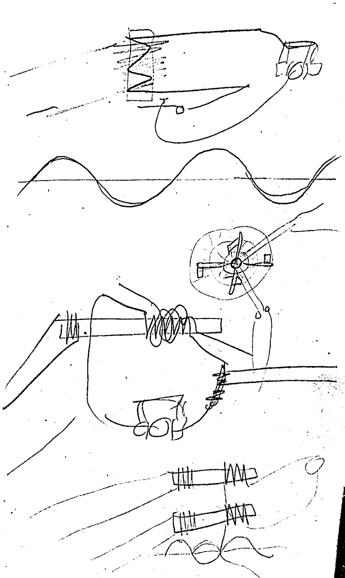
Phono Oct 10 1889

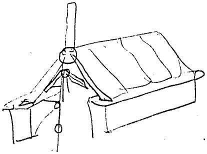







N
S
1 volt
2 volts





25 pct.

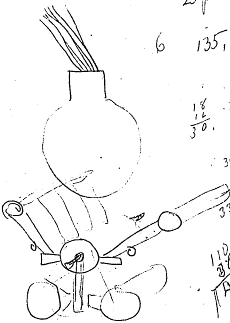
6 135,

18
12
30.

54

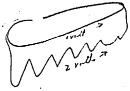
36

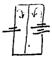
3

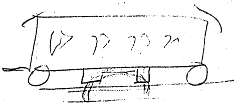


33,

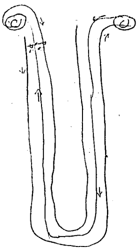
110
36
146

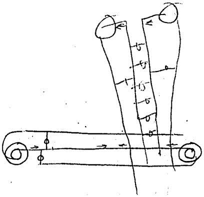


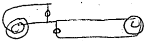


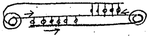


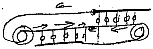
Leander

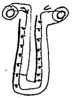


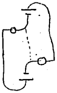


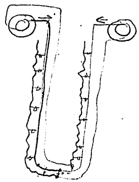


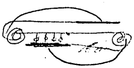


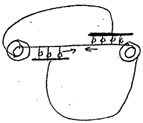


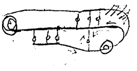


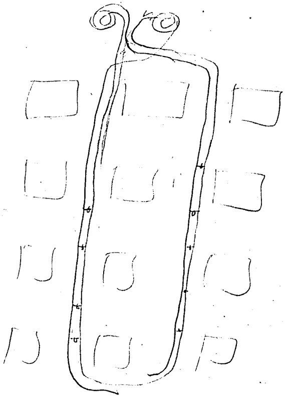


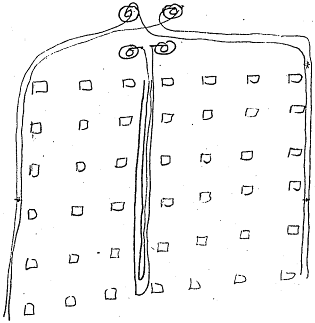


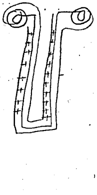


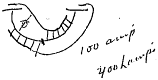


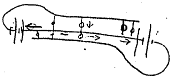


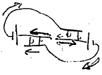


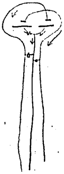


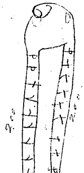


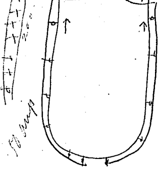


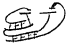


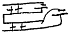


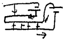


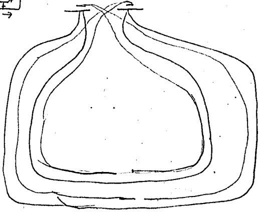


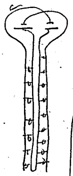












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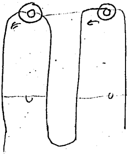

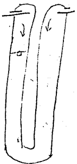

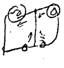

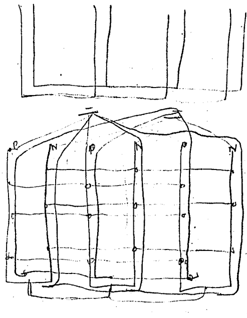
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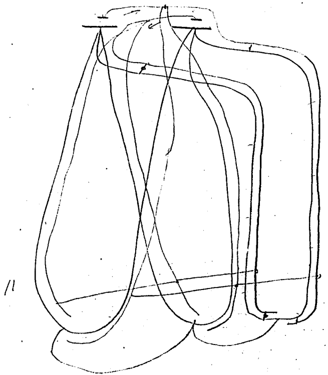
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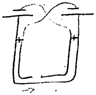

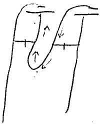

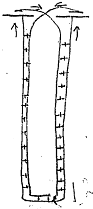

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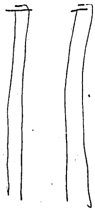

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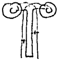

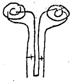

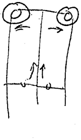

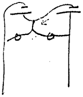

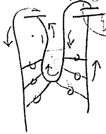

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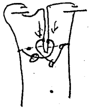

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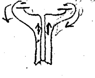

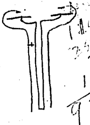

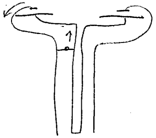

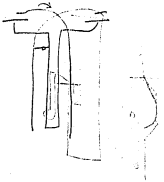

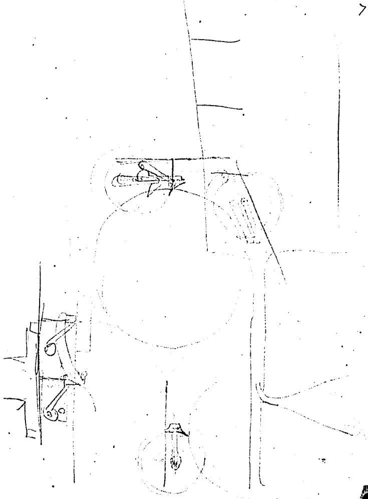

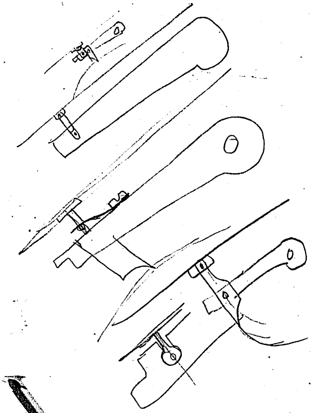

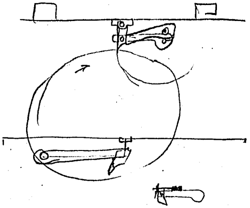

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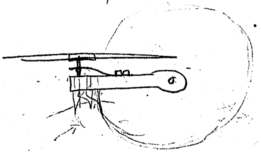

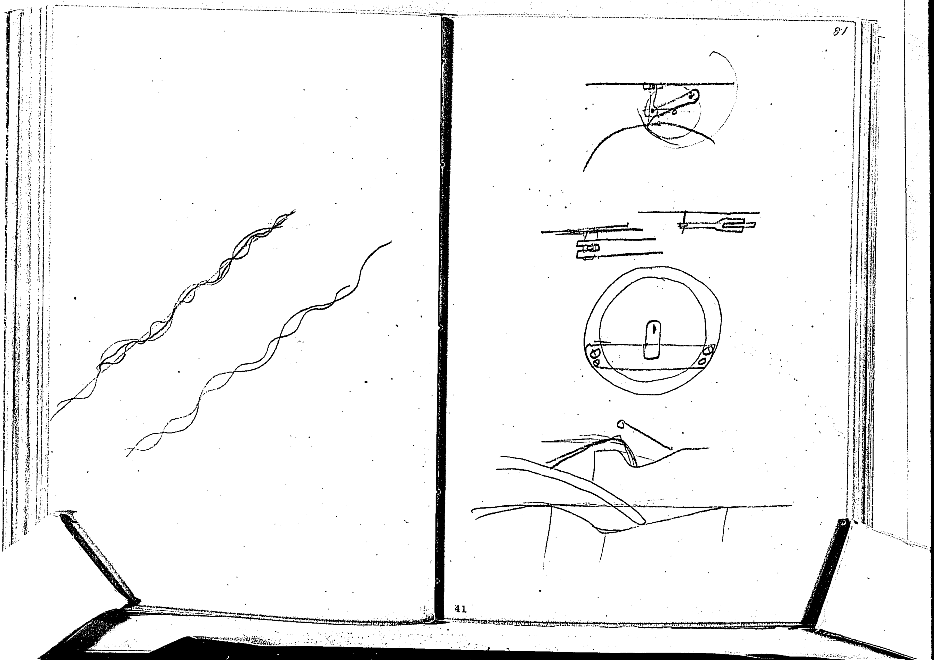
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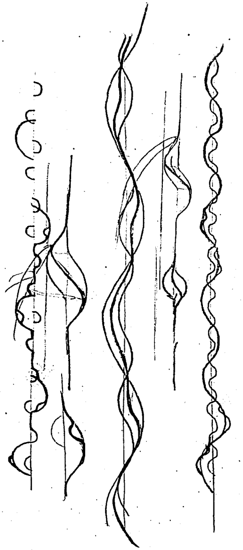

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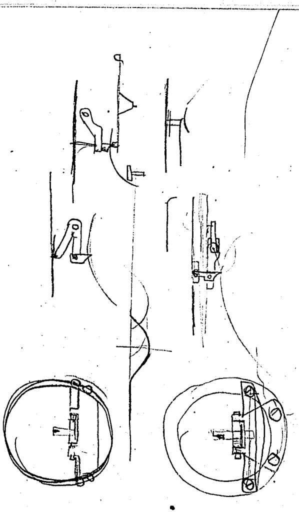

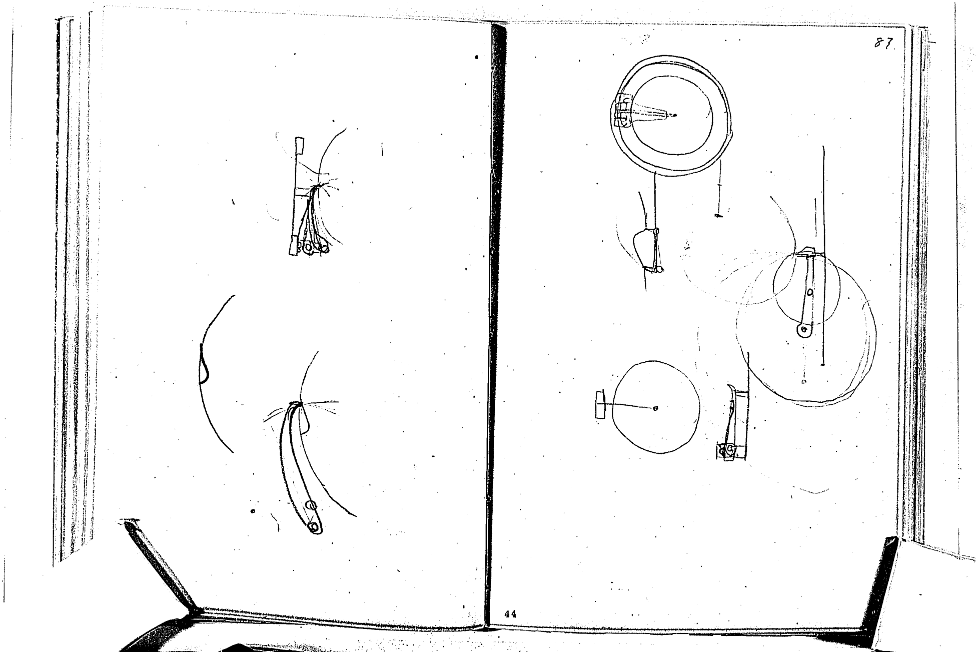

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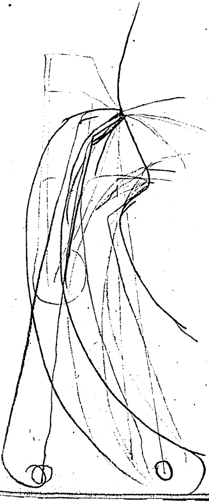

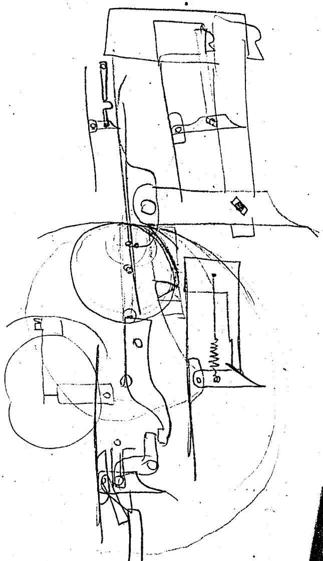

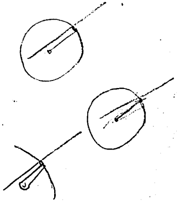

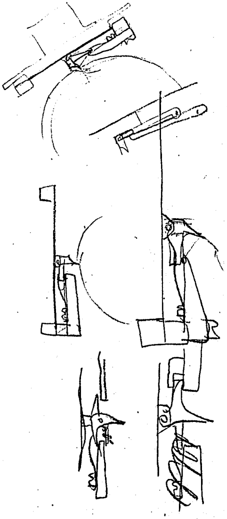

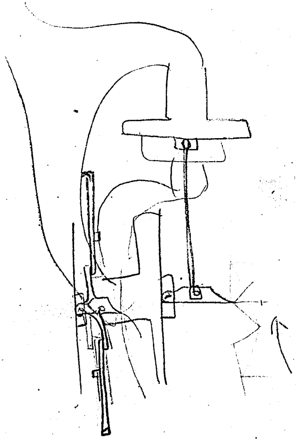

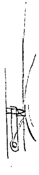

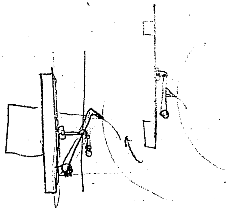

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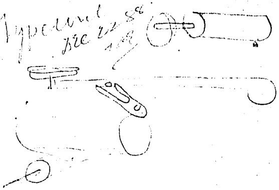

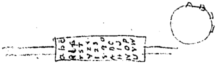

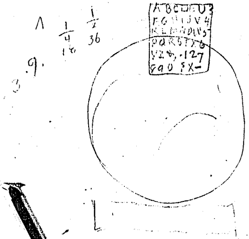

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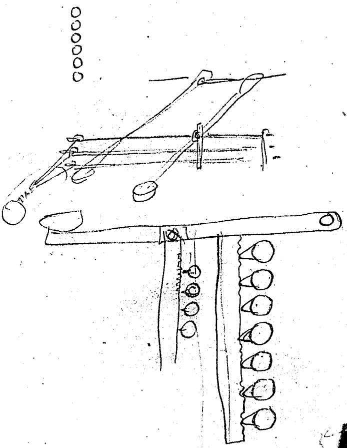

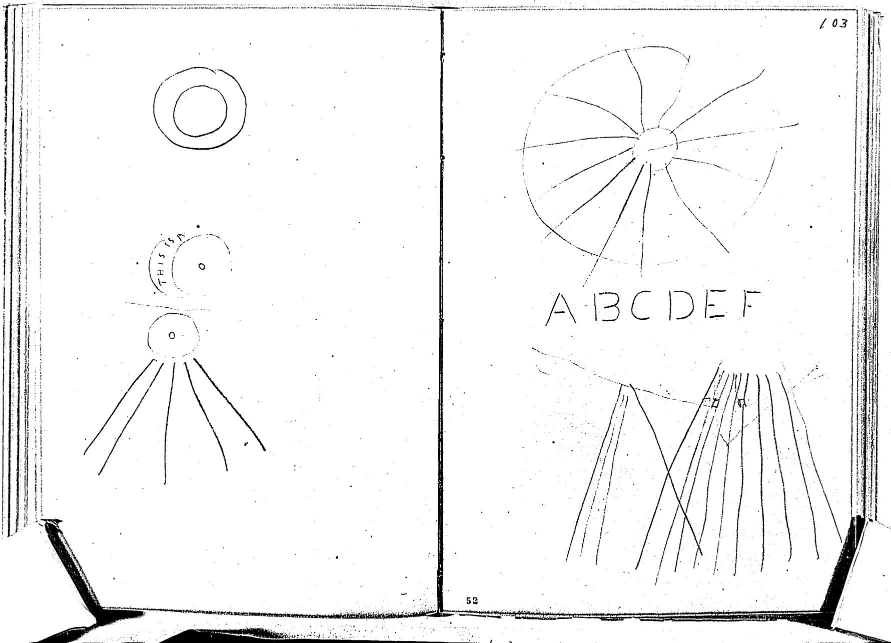
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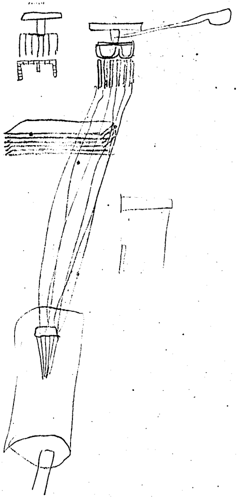

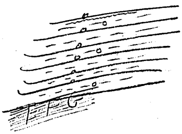

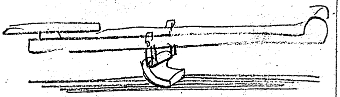

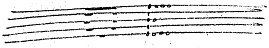

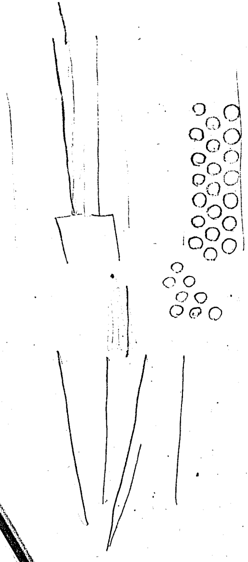

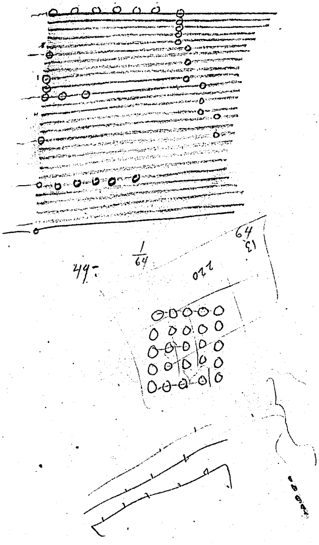
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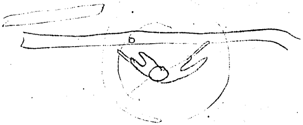

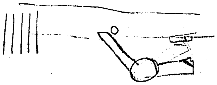

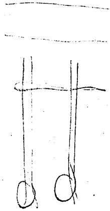

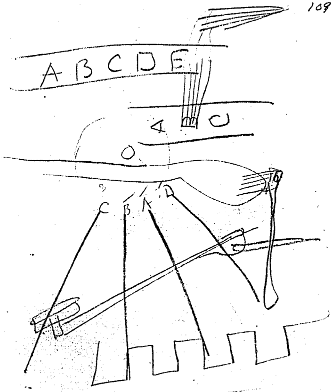
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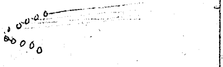

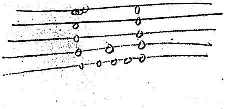

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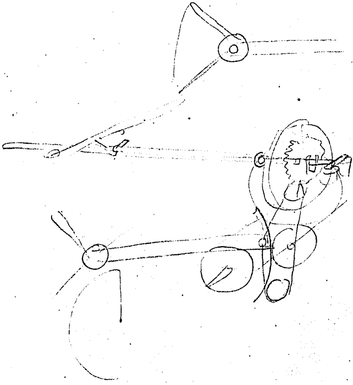

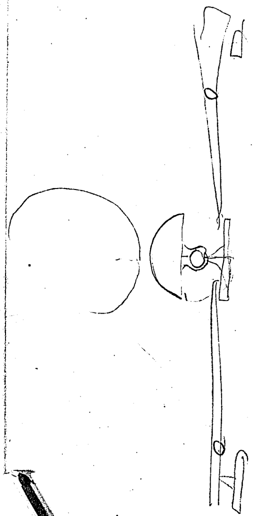

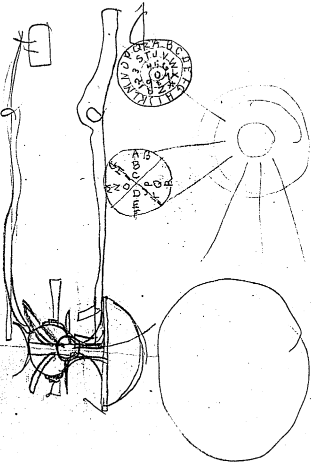
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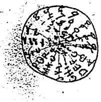

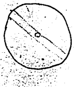

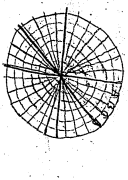

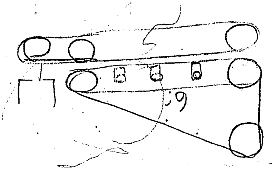

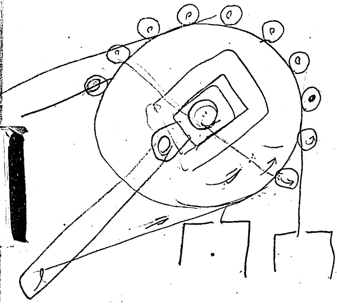

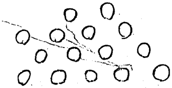

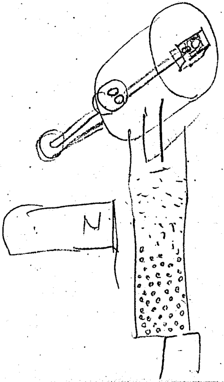
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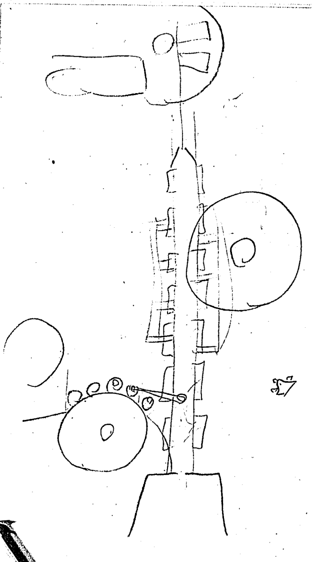

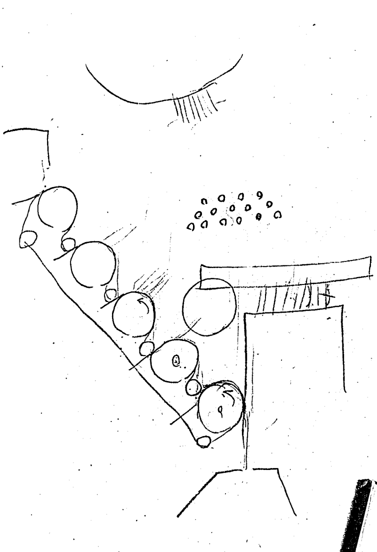

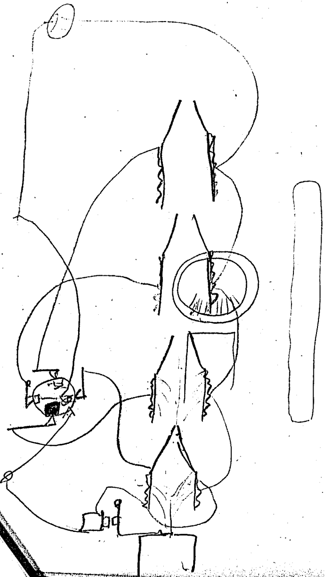

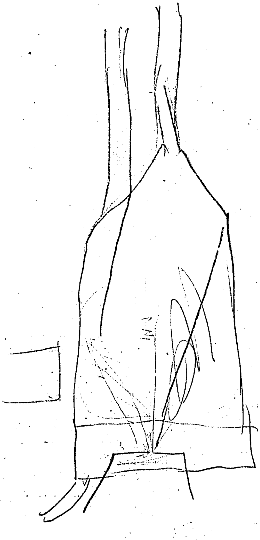

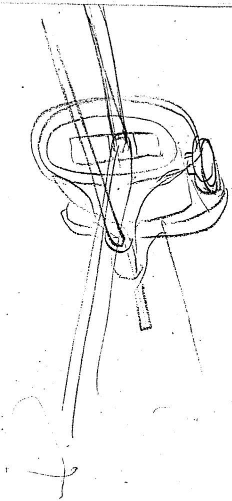

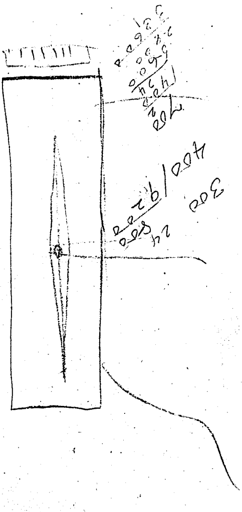
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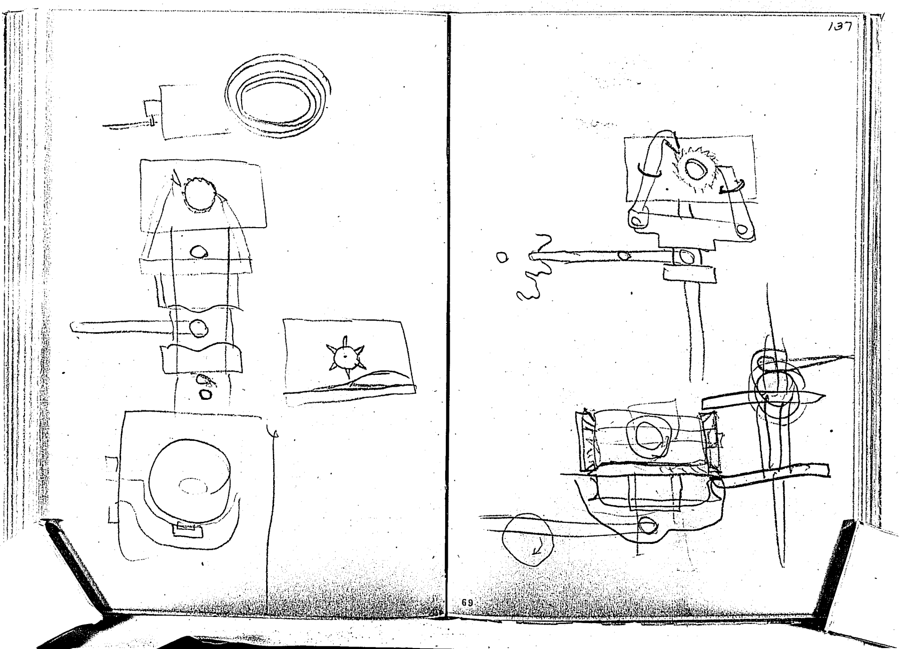

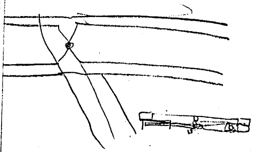

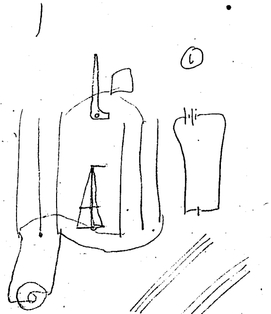
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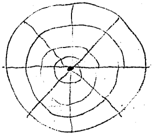

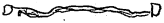

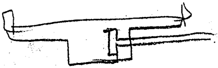

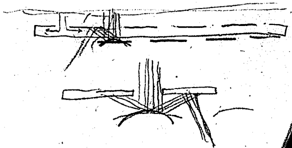

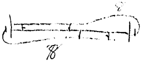

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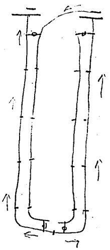
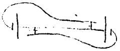
D +10
D nothing
DD + 15





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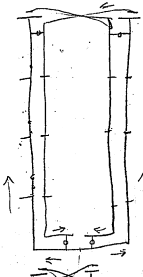

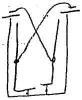

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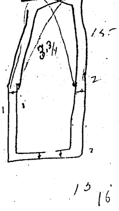

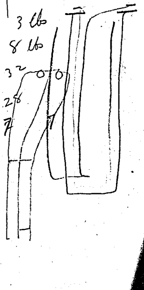

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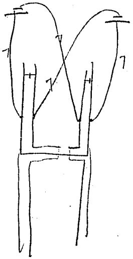

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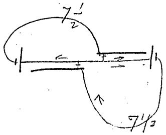

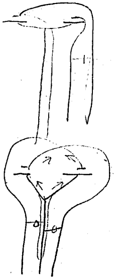

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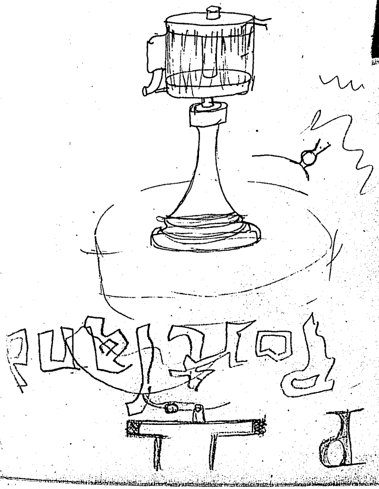

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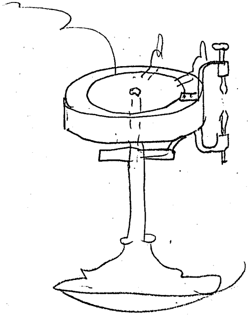

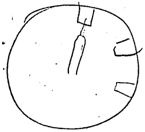

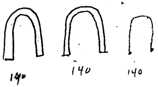

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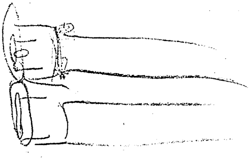

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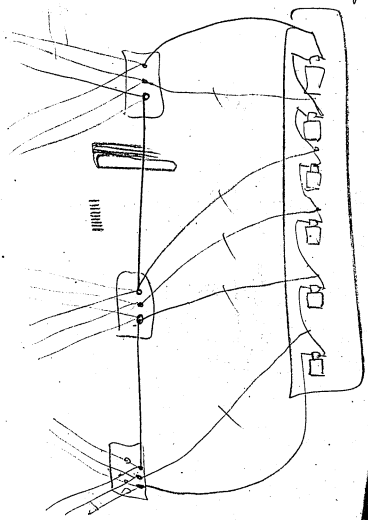

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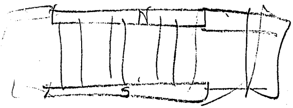

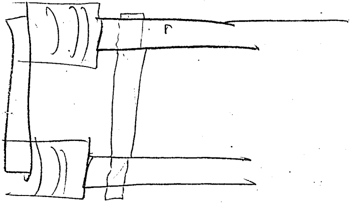

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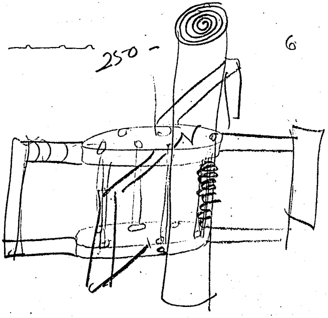

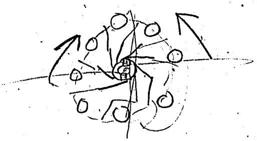

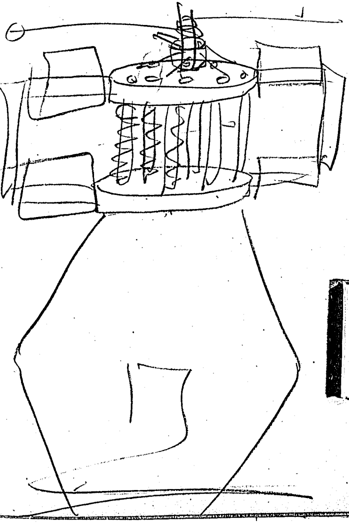

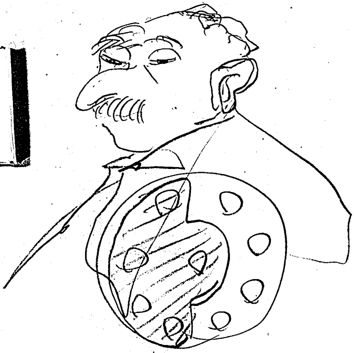

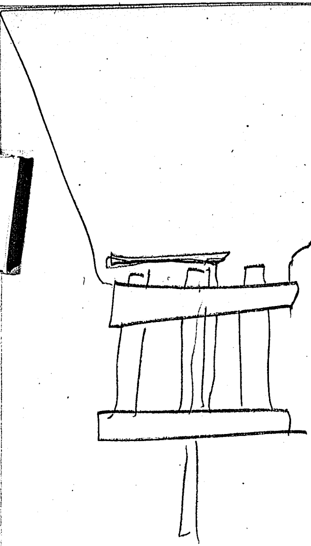

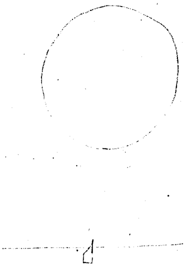

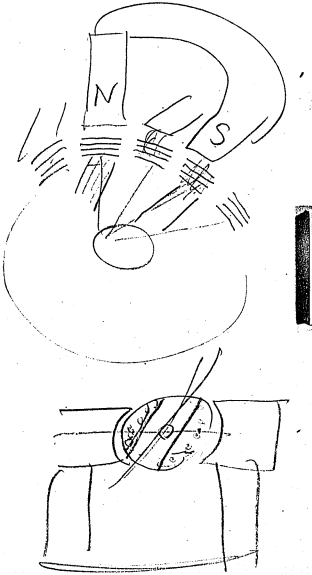
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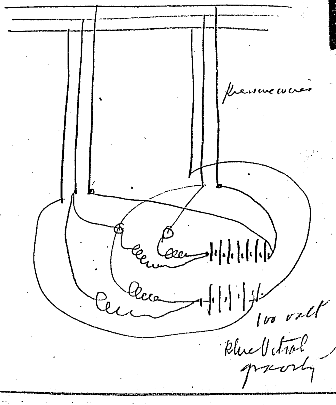
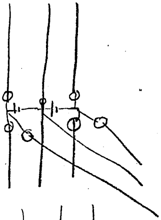
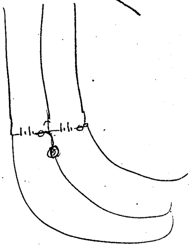
Sept 2/87

New Idea for Volt indicators in Central stations

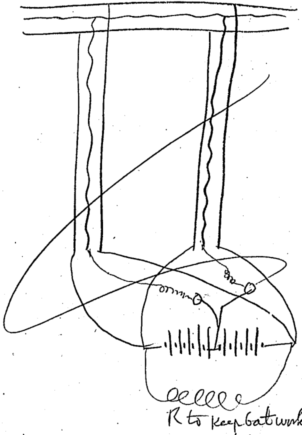






Sept 2/80

New Idea pressure wires

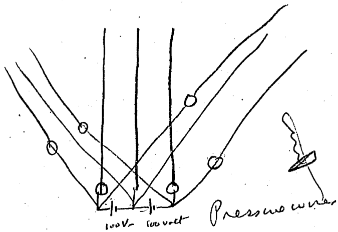


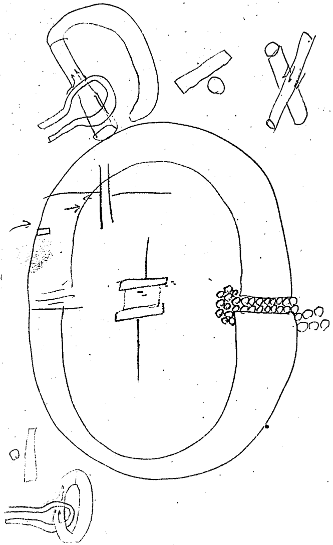
R to keep bat working
prevent difusion

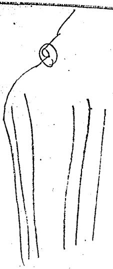
Sept 2/81

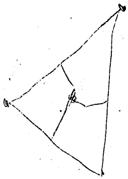
New Idea volt indicators in Station,

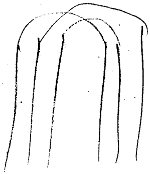
TAE

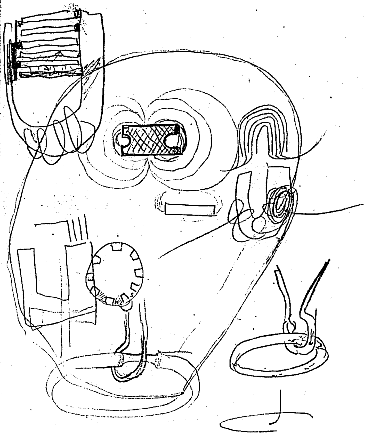


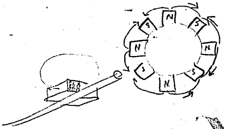








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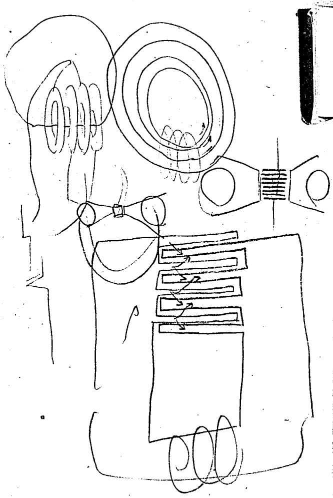

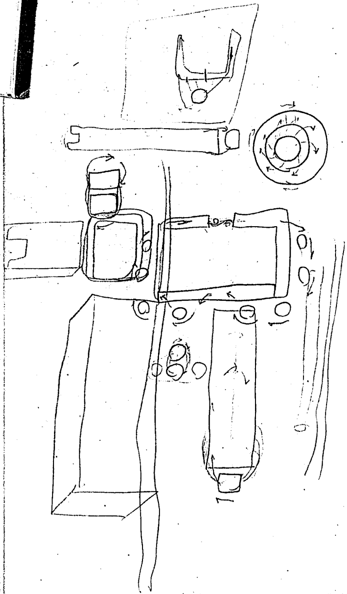

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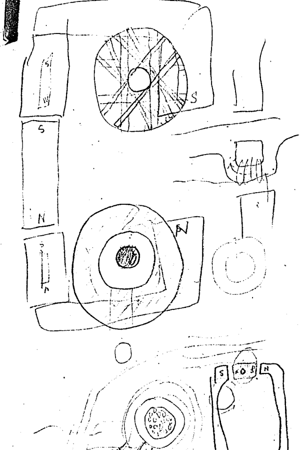
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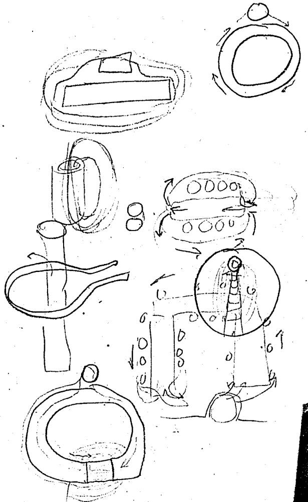
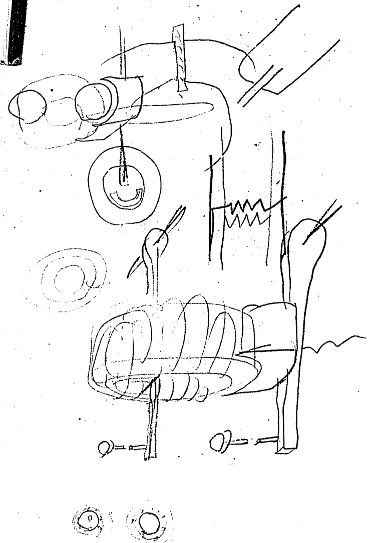
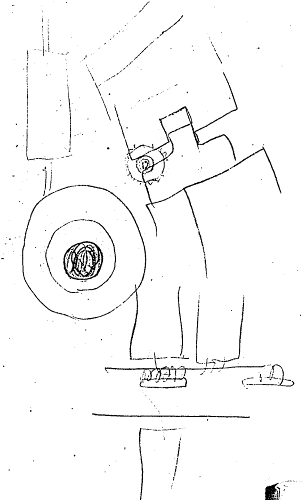
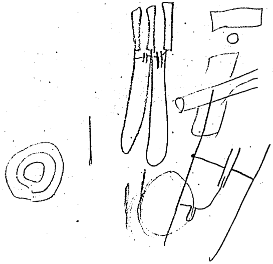
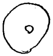
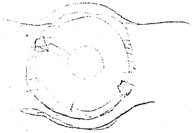


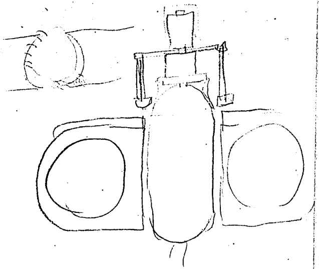


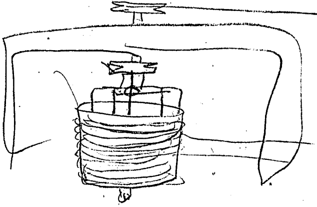


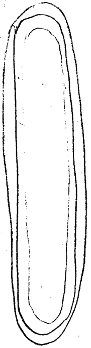


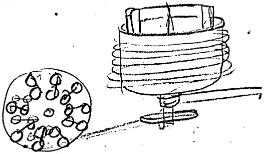


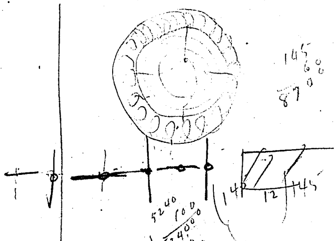












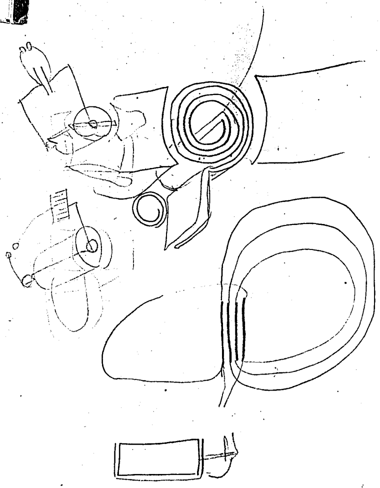
145
600
870

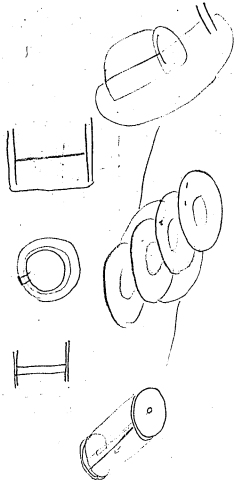
5240
100
524000

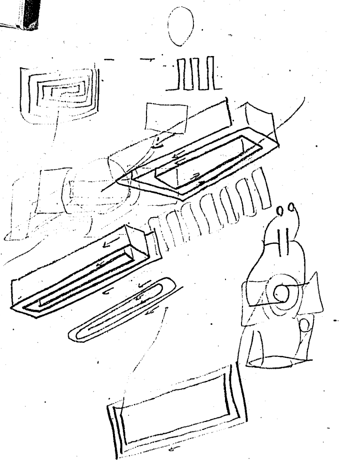
3600) 524000
3600
16400
14400
2000

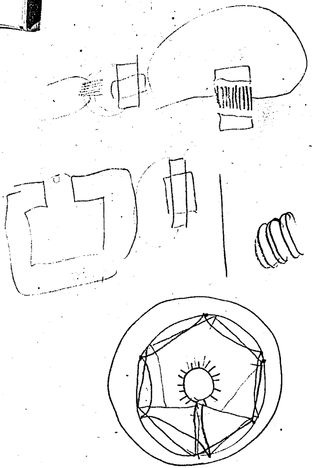
17

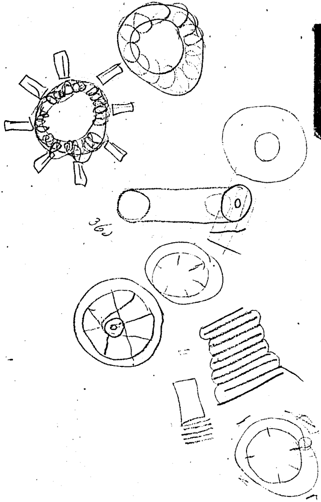
36







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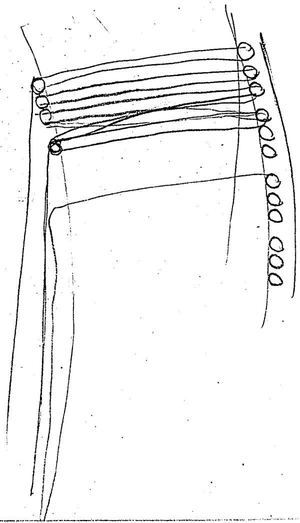
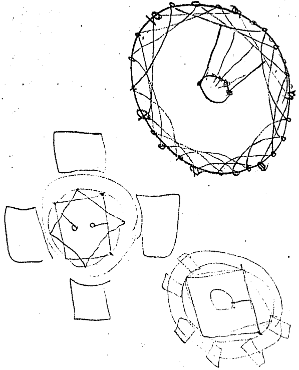
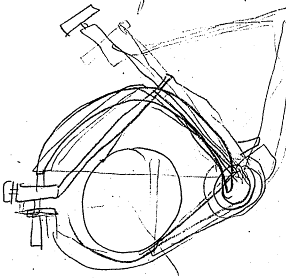
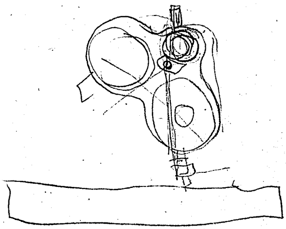
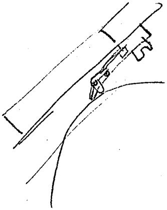




Phongh Nov 27 88
TAE

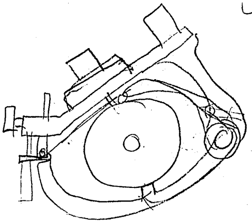


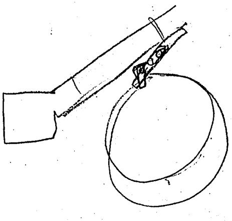




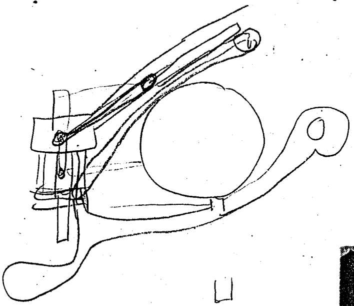
Phongh Nov 27 88

TAE

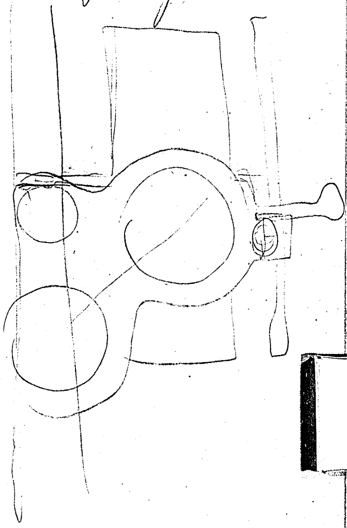


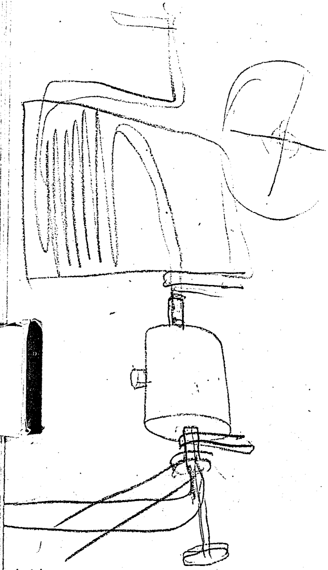


Playwright Nov 27/88



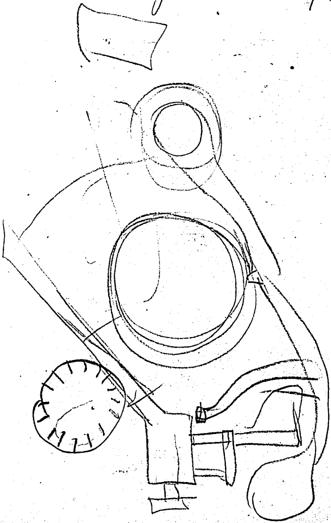
Phonogh Nov 28 88





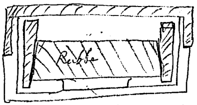
L81

Phonograph Nov 28 88
TAE



Phonogh Jany 11 89 | TAE

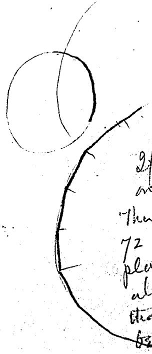
Phonogram



Glued on (ie Cement)

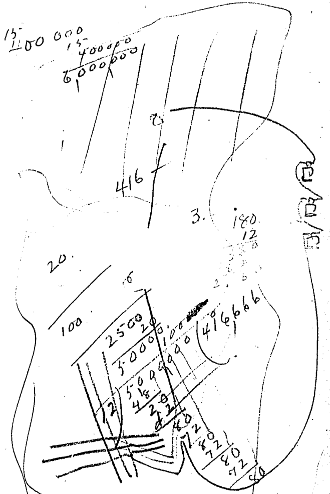
Rubber gives the necessary
spring & allows new
material blanks to be
used — by slowing up
phono to 1/2 speed / say 60
& running out once with
a .004 / Recorder & return
& running again backwards
lines 1000 words can
be got on phonogram 1 inch
long

Kinetoscope Jan 11 89



If $\frac{1}{8}$ photo taken on 3 inch cylinder Then there should be 72 parallel flattened places longitudinally along Cylinder so that all parts of photo ~~be in~~ focus —

glass strip could be pasted ~~along~~ side each other but this is perhaps unnecessary a varnish might be used Collodion etc enamel etc

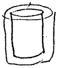

15
100 000
15
400000
6000000
1
1
416
3.
180
12
20.
100
6
2500
20
5000
100
416666
5000
5000
18
4
20
22
80
72
80
72
80
72
80

Feeders	4.	7 00
Eng.	3	3.00
Firemen	2.	2.00
Machinist	2.50	2.50
		1.00
Cupola		.50
Oil		~~16.00~~ 30.00
Coal		

32 00
30 00
62 00

500

Caveat Feby 10 1889 -

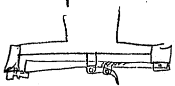


Take Record. chill it to Zero in a mould then pour Hot No 2 to get an inside. Then split this & by pouring hot No 2 while Mould is at Zero. duplicate

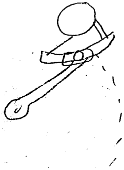
also perhaps typemetal. or soft material warm forced in -

Worsted or thin Cotton dipped in a tough mallea material like Asphalt & Rubber etc to make tough blank for Veneering

Caveat Feby 10 1888,

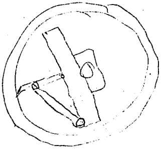


Weight Recvr
tip
also as transmitter

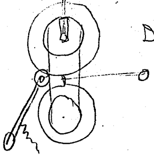


Swing brush

Caveat Feby 10/88



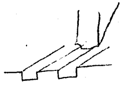
Recording on inside so it Can be split & reversed as Moved



Duplicating

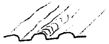
Caveat Feby 10 88

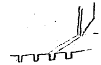
Musical or Master blanks to be Hard Rubber backing & Records to have same,



following tool to take edges off -

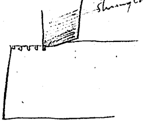
so be thus.

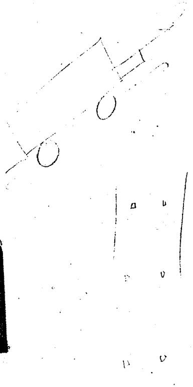




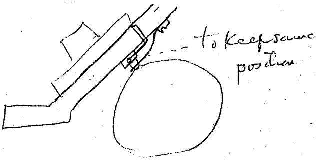
grooving tool forming part of Shaving tool so as to get rid of raised space between lines

shaving tool.

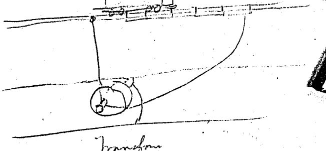


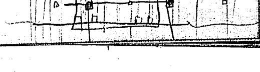


Caveat Feby 10 88



Electric RR





25

.12 .050/100

5/100

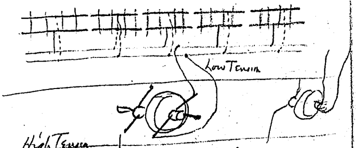
12/1000

2 Volts

44
4
176
1000
7600

Caveat Feby 10 88

Street RR



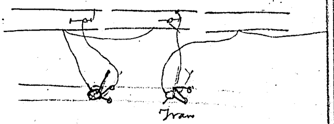
Continuous Reducer

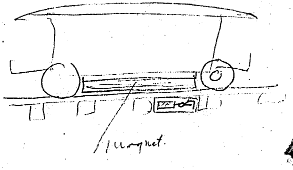
filaments Asphaltenic bodies Squirted then treated in Chloroform with a ~~Sol~~ Chlorinating agent

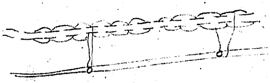
Iodide amylum
Squirted,

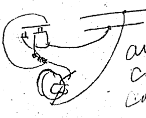
Sulpho~~+~~Anilic Acid
powdered & squirted

Caveat Feby 10 88









auto. increasing current when car comes on section & then reduces curr't when goes off.

1 ohm

15
6
90
50
4500

4 50
50
2500
40
10000
0000
1 ohm 10000
$\frac{1}{5}$ ohm 1 10
1 200 100
$\frac{1}{10}$ 400
$\frac{1}{20}$ .1800
$\frac{1}{50}$ ohm

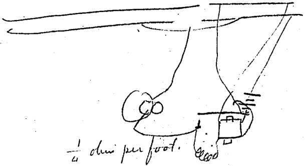
1 ohm
24 hp

15
15
75
15
225
40
900
9000
49500
49500
15 hp

44 20
4000
17.6000 50
88000

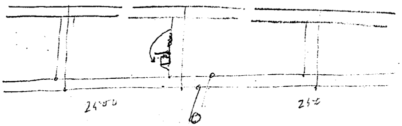
500 feet
150 lamps 500 v
100 lbs 100
50
25
15
100
400
1600
4000

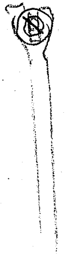
Caveat feby 10 80

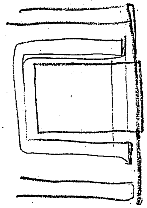


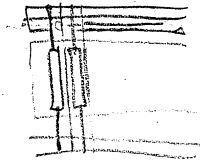
$\frac{1}{4}$ ohm per foot.

2 feet $\frac{1}{4}$ ohm
4 $\frac{1}{8}$
8 $\frac{1}{16}$
16 13
$\frac{1}{50}$ ohm

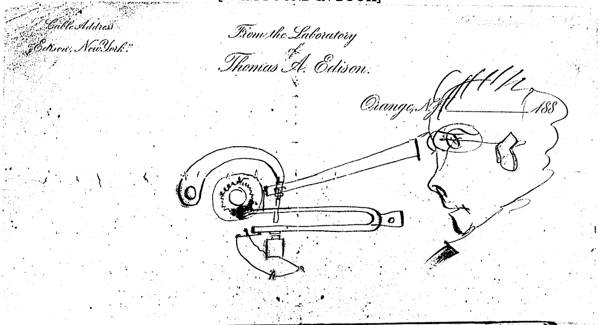

24+00
25+0







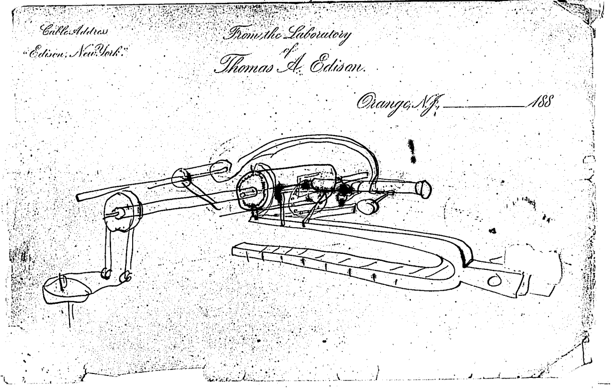
[ITEM FOUND IN BOOK]



Cable Address
"Edison, New York."

From the Laboratory
of
Thomas A. Edison.

Orange, N.J., ______ 188



Cable Address
"Edison, New York."

From the Laboratory
of
Thomas A. Edison.

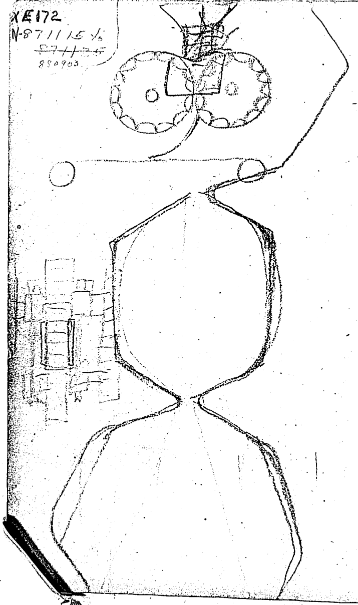
Orange, N.J., ______ 188

Notebook, N-87-11-15

This notebook covers the period November 1887-September 1888. All entries are by Edison. At the beginning of the book is a 10-page draft letter outlining plans for the new West Orange laboratory to James Hood Wright, a partner in the investment banking firm of Drexel, Morgan & Co. and a director of the Edison Electric Light Co. Most of the book contains notes and drawings relating to projects planned for the new laboratory. Included are entries concerning photography, lamp filament, and phonograph cylinder experiments; improvements in the telephone transmitter; and the production of diamonds by chemical means. There are also hypotheses regarding electrical and chemical properties to be tested. Next to each entry is the name of the associate or assistant to whom Edison intended to assign the project, including John Ott, Charles Batchelor, William K. L. Dickson, Arthur E. Kennelly, Martin Force, Franz Schulze-Berge, H. De Coursey Hamilton, John English, and D. T. Marshall. At the end of the book are notes, drawings, and calculations pertaining to hydroelectric power production at Niagara Falls. The book contains 247 numbered pages.

Blank pages not filmed: 206-207, 210-211.

XÆ172
N-87 11 15 1/5
~~87 11 26~~
880903



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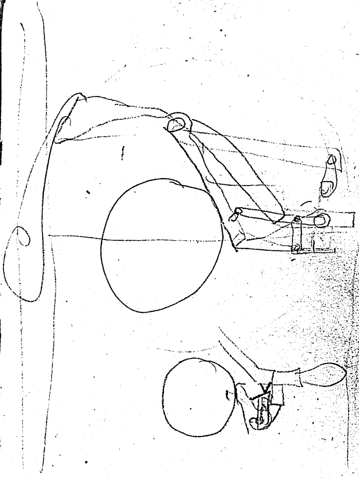
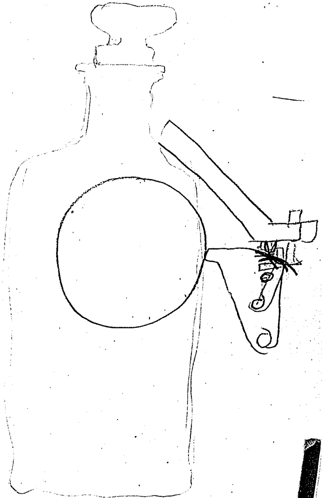




Mr Wright -

My laboratory will soon be completed - The dimensions are one building 250 ft long 50 wide & 3 stories 4 other bldgs 25 X 100 one story high all of brick -
I will have the best equipped & largest Laboratory extant, and the ~~best~~ facilities incomparably superior to any other for rapid & cheap development of an invention, & working it up into Commercial shape with models patterns & special machinery - In fact there is no similar institution in Existence
We do our own castings forgings Can build anything from a ladys watch to a Locomotive -

The Machine shop is sufficiently
large to employ 50 men +
30 men can be worked in the other
parts of the works - Inventions
that formerly ~~cost me~~ took months
& cost a large sum can now be
done ~~in days~~ 2 or 3 days with
very small expense, as I shall
carry a stock of ~~almost every~~
conceivable material of every
size and ~~with the latest~~
machinery ~~a man~~ will produce
10 times as much as in a laboratory
~~with~~ which has but little material
not of a size, delays of days
waiting for castings and machinery
not universal or modern

~~Also~~

You are aware from your long acquaintance with me ~~that.~~ I do not fly any financ~~ial~~ Kites, or speculate, and ~~that~~ the works which I control are well managed — In the Early days of the shops it was necessary ~~that~~ I should largely manage ~~them~~ 1st because the art ~~had~~ to be created 2nd because, I could get no men who were competent in such a new business, — but as soon as it were possible, I put other persons in charge.

~~also think I know my place~~
~~ask I am not competent~~

I am perfectly well aware of the fact that my place is in the Laboratory, but I think you will admit ~~that~~ I know how a shop should be managed ~~also~~ & also how to select men ~~to~~ manage ~~them~~ —

~~With~~ this prelude I will Come to business —

My Ambition is to ~~start~~ build up a great Industrial works in the Orange Valley starting in a small way & gradually working up — The laboratory supplying the perfected invention ~~all~~ models pattern & fitting up necessary special machinery

40—

in the factory for each invention ~~[illegible]~~ My plan contemplates to working of only ~~that~~ class of inventions which require but small investments for each and of a highly profitable nature & also of that character ~~that~~ the articles are only sold to ~~traders~~ Jobbers, Dealers Etc — No cumbersome inventions like the Electric Light. Such a works in time would be running ~~of~~ an 30 or 40 special things of so diversified nature ~~that~~ the average profit would scarcely ever be varied by competition etc —

My plan is to form a Company with a large authorized

Capital but all held in the treasury - to have a board directors Etc — Having formed the Co I bring before it say 5 or 6 small inventions the board decides which ones they think will pay say 4 are selected, Estimates are made for bldg grounds + plant necessary machinery to mfg these 4 inventions. Say 35000, the costs of experimenting were say 5000 The subscribers to the stock take 40000 at par and give me 40000 of stock — Thus of the profits 1/2 would go to the money + 1/2 to the inventor — but to insure the money. The money stock to have a 5 pct preferential div ⑫ if the Co earn ~~20 pct~~ only 5 pct the inventor gets nothing if it Earn 10 percent the inventor gets 5 & the money 5 - if the earnings are 20 pct the money of course gets 10 & Inventor 10 -

Now this would look as if the Co would have to earn a large profit to yield the investors 10 pct but if you remember ~~that~~ the usual royalty paid inventors is 15 pct on the selling price, ~~this is what I ask is low~~ + this is always added + Called part of Cost + the dividends + profits are made over + above this you see ~~that~~, what is paid me is not a reduction in dividends but may properly be charged to Cost of production

Again a great number of these small inventions require scarcely any investment to mfr - $1000. invested in some special tool will turn out articles which would pay to the Co several thousand profit - dollars a year The money would earn after paying my part - 100 to 200 pct - When an invention by reason of Competition etc fails to pay a satisfactory profit we can drop it & substitute something Else, = ~~I would not bind myself to give them every invention but that I might devise but~~.

[illegible] - All inventions
which the Co can manufacture devised)
in laboratory to go to them but
any process etc not capable of
being mfd to belong to E
& no Expenses for experimenting to
be charged Co - all other
~~inventions~~ experiments to be
paid by Co. - Total Experimental
Expense per year limited to
$25000. without the directors
decide to spend more

Inventions relating to EL
WU Telegh - Telephone -
phonograph - Ore Milling
Excepted -

I honestly believe I can
build up work in 15 or 20
years that will employ
10 to 15000 persons & yield
500 pct to the pioneer
stockholders —

I propose starting with
30 @ 35000 ~~$~~
& 3 or 4 small inventions,
Now Mr W do you think
~~you can~~ this practicable
if so. can you help me
along with it

E

Experimental Coating on phono
Cylinder

Paraffine base.

Shellac in Alcohol –
Syrupy linseed oil
" " " in Benzol
" " Turpentine
" " Rhigolene –

Shellac in Benzol –
Shellac in Ether –

Collodion
Collodion diluted –
Copal in Turpentine –
Rubber in Benzol
Rubber in Rhigolene –
" in Gasolene

Solid - Perox Mang - Chlorat K Linseed.
dissolved in Benzol etc

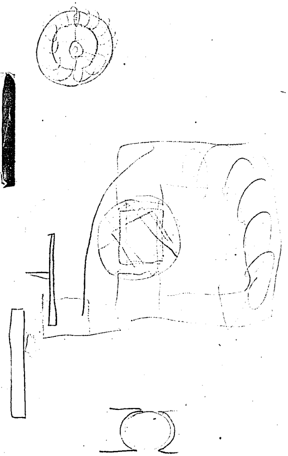
Gutta percha in Chloroform
" Bisulphide
" Benzol
" Gasoline
" Rhigoline

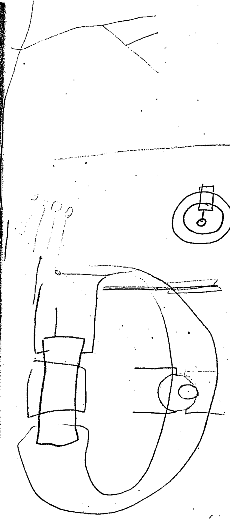
Gum Balata in above —

Soap Base —
Glue
Gelatine
Tragacanth —
Isinglass —
Molasses & Glue dif proportions.
Albumen from Blood
" " Eggs

Bases —
Spermaceti
White Wax
Stearic
Oleic acid

Beeswax
Tallow
Camphor
& Solvent





Borax –

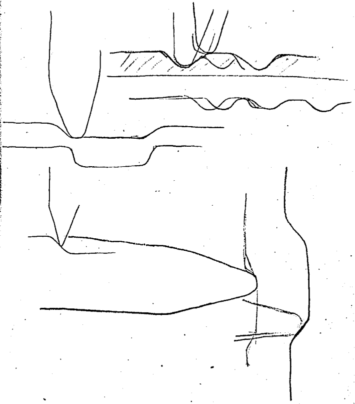
Benzoic acid white –

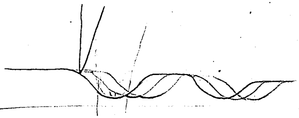
Cocoa butter german in lump

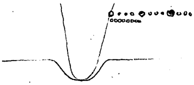
Casein – Japan wax 18c lb

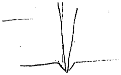
Carnauba wax 22c lb

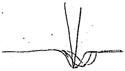
Bay wax 30c lb

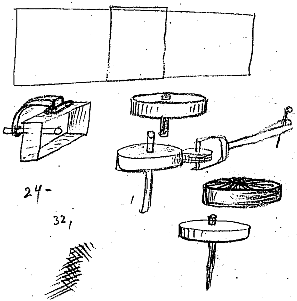











24-
32,

John Ott —

New Laboratory — Nov 15 87

In rotary thermo use alloy of Arsenic & Cobalt Mispickel Cobalt glance — Cobalt & Sulphur

Sic of Cobaltoso-Cobaltic oxide which is steel gray crystals under some conditions is a good Conductor & test its other properties for thermo — for telephone storage, etc — its usual — Nitric HCl & Aqua Reg

English (Spegilheisen — for rotating Thermo

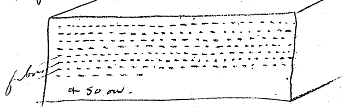
Batch (Alternate a powerful Current through heated wrot & cast iron see changes —

Dixon Photograph Sc[illegible] Machines

(41)

For carbon forms. Nov 15 87

put wires in + press + carbonize + afterwards dissolve wires out.



Possibility of forcing out wrot iron brat to plastic Condition into pipe by Lead press lined with fire brick + with fire brick plunger —

Make Curve of Lamps for fall candle power & life at 80 + 16 cp - at several points of lower vacuum than we usually use — to do this perhaps a definite Kind of residual gas must be used again

Patent

[illegible] in Marshall's book

Nov 15 87

~~the Carrying + Center wire~~ Current may be too strong at 80 to entirely vitriate | result while at 16 it may be entirely absent. There must be a point at normal where there can be no infinitesimal arcs & hence Cp will go up & life be great. Bad Vac Lamps go up in Cp & give good life -

Measure the resistance of presser buttons under constant pressure & Electrode surface of every known oxide or compound & their behavior for future use

Entered Mayhall book

Expts to determine

Shelby Berge

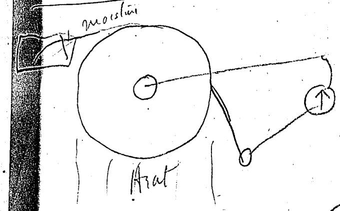
(44)

||

(45)

Nov 15 87

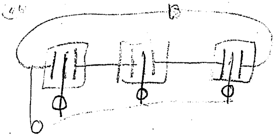
Experiment on the puffy gas hood to get a sensitive but hardy hood - hold it on pressed (lead press) film of alumina etc,

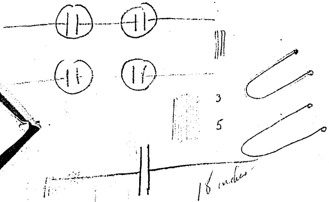


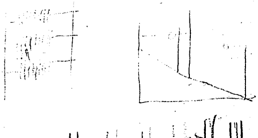
Shultz Berge or Kennelly

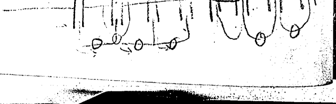
Motograph for generating Current Heat altering Capillarity gives Current Work up & study cohy turning EMG gives Current

~~[illegible]~~







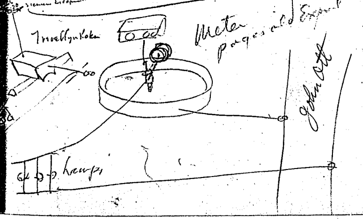


NOV 15 87

Force Make the Torpedo Lamp for submersion for Murdock

Dixon Photograph through metals & other thin plates Opaque to daylight –

Chemist Building Exp Get a locking material for magnetite, that requires only a trace & is a flux also …, Lime water – Sil Water glass, Lime – Lime in Sugar – brick Clay – Etc ?

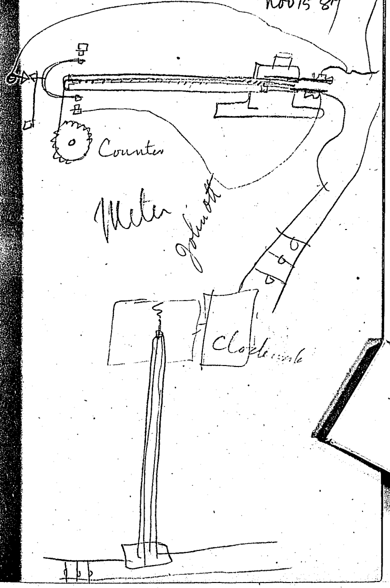


602,000

1

5500000
1000000
2300000
3 | 18
602666
1770
4
5334000
1507360
14079980

Nov 15 87



(50)

int.

119 000
18 980
137 780

130 000
1 500 000
626 000
200 000
150 000
120 000
100 000
2726 000
2775 000
190 000
~~1880 000~~
3091
626 660
1880 000
626 660
1253 340
240 000
1493 340
1194 672

626
3
1878

(51)

Nov 15 87

Use a reverser + Wire in Calorometer, get heat with Constant Current & then heat when reversed – I think heat will be as great with alternating will be as great with alternating + ¼ of for insulation or break wheel as with Constant Current (ie) orienting Molecules require Energy which is lost in heat.

---

also get one of those wire testing machines same as Gellilan had at Boston ~~& alternate Currents through Copper soft + hard~~ & take breaking strain after different times.

(52)

Select another man for these Expmts Nov 15 87 (53)

Marshall

Deposit Silver on Muslin Lace silk Etc in Vacuum-

Chemist Marshall-

Study the Carbon from the action of Dehydrating agents on organic material

---

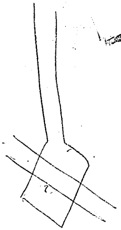
~~Marshall~~ another man

Deposit Chromium on glass in Vacuo-

Young Machine Running Room

Carbo preliminarye at 300 in asphalt 3 days then bring to 600 and take out dip & run neg-

---



75

125
75
625
875
9375

75
40
3000

watts
1 ohm
100 amp

75
3
225
1750

200
100
100
50
2 to 1
4 to 1
500

Nov 15 87

Measure resistance ~~of~~ between 2 plat wires in porcelain tube white hot wires say $\frac{1}{4}$ inch apart also one plat 1 carbon – probably with latter get a current!

Shully-Berg

Try Chlorine in in Lamp with paste clamps for low Vac residual – use Chl Chromium – also use Cyanide Silver but only at normal so as not to decomp the Cyanogen – put on U tube with Hg graduated in Millimeters

Entered in Marshalls book

Nov 15 87

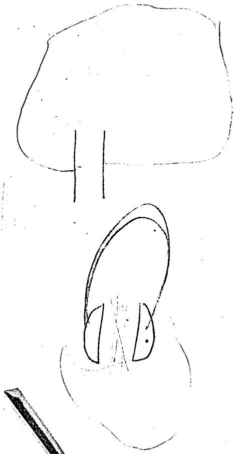
on new phonograph
Have small magnet work
the ~~said~~ Recorder at the other
End of the telegh line have a
Vibrator & break it up into dots
& dashes record this on cylinder
~~at~~ & speed it to send at 3 or 400 words per minute
then put on reproducer & let
Cylinder run slow to copy
out Morse — Use Motograph
also Talk over wire & record —

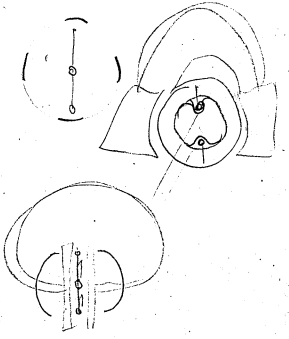
See if plumbago'd wax
phonogram or rather
Lamp blocked will
when reproducer passes
over vary pressure & retransmit

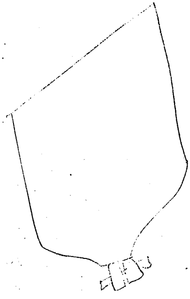
Hamilton

Try Experiment ~~of~~ sinking
well ~~or use some well a~~

Over





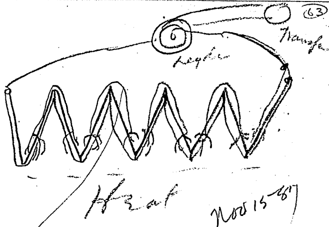


Connect wire from a high to low place on Earth get dif potential, also wells — Nov 15 87

Connect tin roof Laboratory with wire to Earth get potential —

Try heating one side of static Cylinder & then take off Electrification by a metal which reduces back to stand, temperature a great variety of material can be used — I believe Electrification by rubbing is due to heat & to a Thermo pile action (IE) a Thermo pile of tremendous EMF — This can be got into a current form by transformers & condensers reducing potential to workable quantity

John Ott



Nov 15 87

Collectors,

Try metals connected to non conductors also The P & N non conductors which are rubbed together with collectors to take off E, Either by rubbing contact or at distance

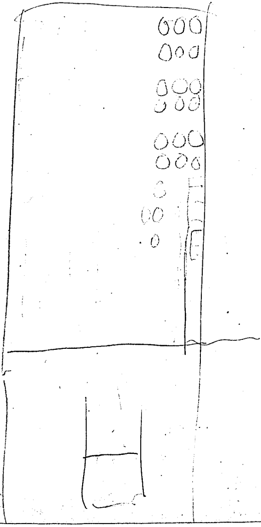
Nov 15 87

In a meter use a magnet
which will have no stick
like Iron reduced by H
mixed with shellac - paraffin
etc -

Ott

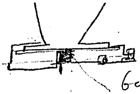
Try an induction coil on
telephone with core of paraffine
& Iron Reduced by H put as
much Iron in as it will
stand & still be an insulator,
Make quick changes of reg
iron wire core & this to get
Volume of Sound if this
works well perhaps it will
work in receiver -

Ott



Nov 18 87

Make a telephone transmitter with lampblack button like the recorder of phono.

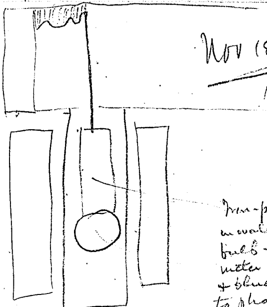


If induction coil with Iron reduced by H works - then make a transformer with core this way & also with Higher melting point stuff for armatures of Dynamos for High Speeds —

Try some of that non magnetic Manganese iron (they have recently discovered) in connection with Thermo Experiments

or Lead Composition [illegible]

Nov 18/87



Iron-paraffine Core in water bath by bulb — Lamp in water green light & blue paint paper to photo paraffin scale — use Clock work work paper Induction magnet or point paraffin Core

Ott

Try a telephone diaphragm of celluloid coated with shellac dusted over with iron reduced by H. also double dia with iron powder in between,

Ott

Nov 18 1887

It may be that to Electrify
a piece of rubber by heat it
would be essential to radiate
it from Sealing wax or
touch cold rubber with Hot
sealing wax, etc using
in some manner the two non-
Conductors which when rubbed
together gave opposite E's
or two wheels one of Rubber
other of Shellac rotated
between a disk of hot water
with Collectors Leyden jars
& transformer to reduce
it to some deg of ampere
Capacity

Nov 18 1887

There is something very strange
that just as you go to worse &
worse conductors you get higher
Volts on Thermo thus. Bis
Tellur Selenium amorphos-
if you keep going on you
go to perfect insulators. (ie)
better & better transforms
of heat into E, but the
conditions of getting a current
grows beautifully less
but if right conditions (ie)
induction & transform
intervene you should get
over the bug —

Nov 18 1887.

Shultz Berge

There may be such a thing as polarization at the ends of magnets, hence coat over surface with various things finely divided iron - Coat one pole also different from the other,

---

Kennelly

Will a galvanometer deflecting 10 degs say on one ampere give more or less in a Vacuum —

New Chemist Ent

Investigate the black matter on one wire on inside part of E Lamp also analyse the deposit in globe

280 5 2

1

15 25)150(6 2½ [illegible] Cont.

21c 580
300
880

580)2240(2.54

254 1
254 2
508
254 3
7.62

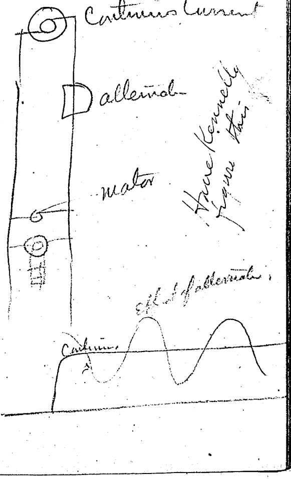
8.29
5.80.3

70)270(3.85
70c

270)2240(8.29
385)2246(5.8.1

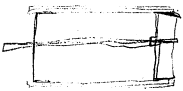
Nov 18/87

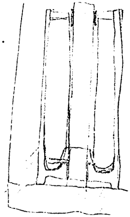
Method of using transformers by alternation on transformer but one direction on mag[illegible]

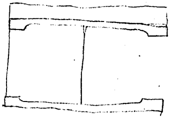


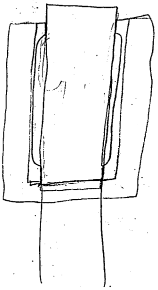
Have Kennelly figure this

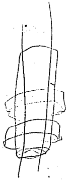
XE
N-8

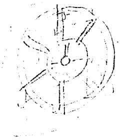


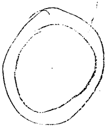


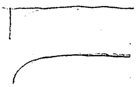


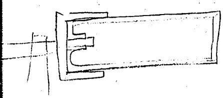


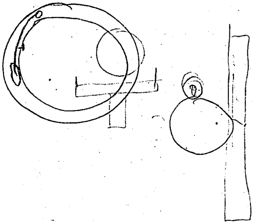




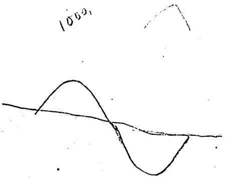






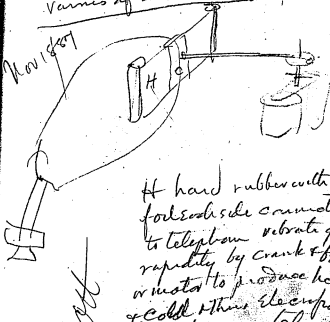

D

1 - 2
2 4
3 8
4 16
10 100
100×100 50,000
1000.



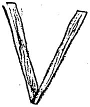
On Rubbing hard rubber it is electrified and then on passing your hand over it it isnt discharged shewing that the Electrification goes to some depth (e) a dielectric stress - hence use metal plates with very very thin solutions or varnish of the Electrifying material

Nov 1867



H hard rubber with foil each side connected to telephone vibrate great rapidity by crank & belt or motor to produce heat & cold & thus electrical? waves hear in telephone

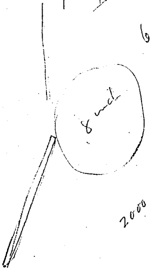
(88)



33
60000
19800000
[illegible]

60000 blanks per Rev

60)20000(331
180
200
180



2000 men

2500 blks to m
24 inches

2500
24
10000
5000
60000

Nov 18/87 – (89)

Perhaps Nickel wire gains & loses its magnetism quicker than iron – try it in phono & telephone Induction Coil –

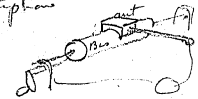
In Thermo Electrification by heat Expmt perhaps we dont want ~~Dio~~ Dielectrics like Hard Rubber that hold their Electrification so long – they would be like a permanent – we want something that will be electrified & deelectrified almost instantly

Nov 19 87

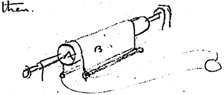
I have noticed that in vacuo it
takes a very high temperature to
decompose cyanogen, also that in
low Vac lamp ~~the~~ Cp goes up —
now as there is certainly arcs going
on in the filament even at normal
these arcs must have sufficiently
high temp to decompose cyanogen
& yet the main body has too low a
temp to do so — hence by using
Cyanide of Silver in side tube
& getting high Vac & working
lamp up in reg way ready to
seal the Silver salt may be heated
& enough Cyanogen driven off
to bring the Vac down to the
point required using a U shaped
guage or a spark if the
latter dont decompose too much
cyanogen or produce other
bad results — Thus if lamp
cut up at normal most arcs
be prevented by low vac &
those do occur will be stopped
by deposit carbon from
decomp of Cy

Nov 19 87

If we rotate a bismuth Cylinder with a fixed Antimony rubber we get a constant Current as shown by my Experiment with rubbing Wires together & listening to telephone



Now if friction E is a Thermo electric action then.



using two metals A which is shellaced very thin or other varnish like collodion & B a sheet to give great surface & microfarad capacity ~~the~~ it should act as a thermopile condenser & be constantly charged & give a current,

according to Faraday hot Dry Oxalate of Calcium stirred by plat or glass become positively electrified in a powerful degree partial it may be lifted out of the dish

Nov 19 87

Erdman states (Sullivan archives of Ex V, 480) that if any thermo pile be rubbed at its junction it gives a current that it cannot be due to heat as it commences instantly & ceases instantly the friction commences & stops — This is very important if true. an other Expmt in Watt article on E confirms this

May it not be probable that more Energy can be transformed when a thermo junction is rising & falling in temperature than when it is kept at constant temperature higher than the other junction — this is so in pyroelectricity of crystals, no electrification while temp constant but only shown in on rising & falling temp —

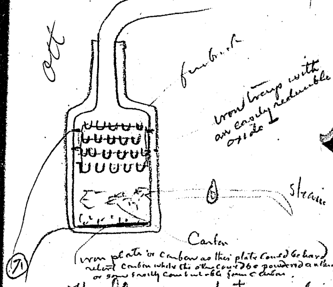
---

a cold wire (same metal) touching for an instant a hot wire gives momentary current,

Good?

Nov 19/87

att



(iron plate or carbon as this plate could be hard retort carbon while the other could be powdered anthracite or some easily combustible form of carbon.

The flame conducts inside

Meluccer says combustion Charcoal in pure O gives no E but with H_2O Charcoal plate charged with Neg E & Carbonic Oxide or anhydride to Pos E. In above The steam is decomposed by hot Carbon which becomes Neg & CO_2 reaching is reduced by the Oxide to CO + the flame gives good conductr

Nov 19 87

Batchelor [illegible]

Iron pyrites are good conductors hence in ore milling use heavy amperes & pack 3 or 400 lbs in a Earthenware tube with end electrodes put on pressure ~~a~~ send current to roast —

Try roasting reg way but in Lump · think twill prolonge Easier —

Edison

Study the repulsion of a flame by a magnet.

Chemist Marshall Edison

Monosulphide of Carbon is a maroon colored powder stable but decomps at 200 C into its elements, this might be good as the Sulphur would take out the mercury & not attack the plat wires

nov 19 87

Why shouldnt Iodide or Carbonates of Aluminum heated to intense heat in a Vac be disassociated & give the metal there being no oxygen present,

Marshall

See 3rd Supplement Watts page 1746

Colophthalin = a Hydrocarbon $C_{10}H_6O_2$ Resembles alumina - its infusible - non volatile & not Decomp by Nitre or Chlorine at 1000 centigrade -

Chemist Marshall
Entered

Nov 19 87

I believe. all chemical Elements which
give more than one line in the Spectrum
are like the Hydrocarbon series
for instance we have the several
paraffines - Why should there not
be several Hydrogens if three
lines of H then there are 3 molecules
of H each definitely arranged
I think for instance that,
take an oxide of a metal that
gave widely spread lines
say 4 lines that by
~~do~~ means of solvents
it the oxide could be
seperated pretty fairly into
4 qualities of oxides - &
~~Hence~~ Each would give
one particular line brighter
than the other - shaded lines
are simply oxides with slight
Changes only. —

Nov 1887

Batchelor

Carbonize Elder pith - Cork & other light matter to get a finely divided Easily powdered charcoal for Lamp filament by squirting

---

Hamilton

See if pure Anthracene will mix & harden paraffine with Carnauba - or leave out Carnauba

---

Edison

Try the Experiment of putting Crude anthracene in High vac & volatilizing see if commercial & Examine residue

---

Chas Bat

Distill hardest paraffine until the highest boiling point paraffine is left

(106)

Nov 19 87 (107)

Chem Marked Extd

Phenylnapthal-Carbazol $C_{16}H_{11}N$ fuses at 330 c & has a higher boiling point than Sulphur —

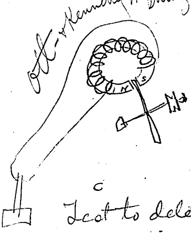
Chemist Ext

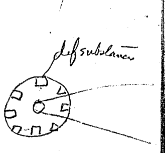
Crude Anthracene contains all the higher melting point H Carbons - by sublimming in a vac probably or boiling in open air I did probably get a residue that would be good for filaments. —

Extd S. Marked L

In Lamp Expmts with diff deg vac to see effect on Drop Cp - make 20 Lamps ~~[illegible] cphp~~ 320 cphp - of each deg pressure & see up at normal use Cyanogen as a residual

Ott — & Kennelly & Dinwiddie-Buzz Nov 19/87





Test to determine if anything will retard lines of force?

Experiment on the static changing of rotated matter in concentrated magnetic fields

Nov 19 87

As platinum readily amalgamates when Hg is allowed to run into a Vacuum. I think it probable that clean Object iron in Vacuo can be beautifully Covered with ~~tin~~ by deposit (ie) Vacuum with arc & allowing hot tin to run in —

---

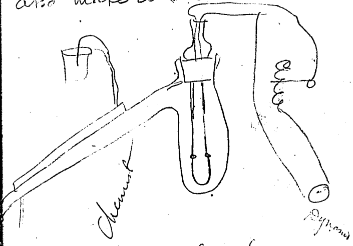
investigate the substance produced by heating the filament when the globe has a mixture of Napthaline & paraffine in it — it seems to have tremendous high melting point & the most dazzling fluorescence probably by crackling of film only

(112)

Nov. 19/87

(113)

also make a still thus



Try different Hydrocarbons
Etc =

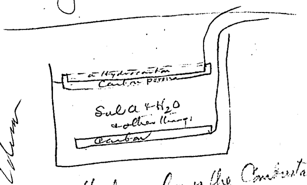
(Try if Roasted auriferous pyrites mixed with carbon & salt water & left to itself in warm place won't entirely decomposed —)

(114)

Nov 19/84 (115)

Monkey with [illegible] current under various conditions through Sulphide to see if there could be such a thing as a transformation

Batch x Edison



Edison

The Hydrocarbon is the Combustable

Galleïn or Gallin carbonizes without change.—

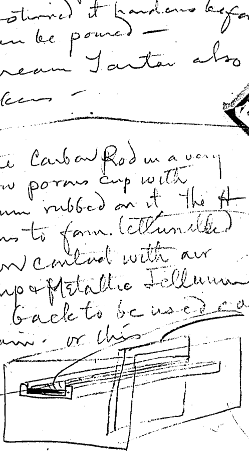
Chem-Marked Ent

Nov 19 87

Plaster paris mixed with H_2O Containing some Potassic Sulphite — in Molecular proportions when mixed & stirred it hardens before it can be poured — — Cream Tartar also quickens —

Try the Carbon Rod in a very narrow porous cup with tellurium rubbed on it The H Combines to form Telluretted H & on contact with air decomp & Metallic Tellurium falls back to be used again. or this

Sheets 13



put powdered Tellurium on top Carbon.

Nov 19 87

in Watts Dic 1875 2nd Supplement
p 638 - speaks of decomp of
BiSulphide Carbon by heated
platinum Spiral - with
decomposition ~~into~~ Carbon & Sulphur
also ~~page 657~~

Chem-Marshall Ent

Watts 2nd Sup p 722
Hydracrylamic acid - Sol
water. on heating to 170 C
turns brown. sublimes also
in feathery needles at higher
temperature it decomp completely
leaving a very difficultly
Combustable charcoal

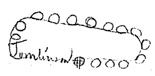
Nov 20/87

Idea for a steam Engine — Use two boilers — one containing ~~[illegible]~~ say sulphate of Copper In powder — ~~[illegible]~~ heat this with fire to dehydrize & make steam — or to make feed water to 2nd boiler — use it in Engine & then exhaust into the dehydrized sulphate in other words procure & also condense your water from a substance like Sulphate Copper utilizing the heat of all the reactions,

---

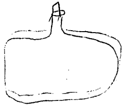
Fill large boiler with several tons of Cocoanut charcoal, allow it to absorb a dry gass & then Close & heat to [illegible] pressure to work Engine, Thus we can Condense Atmospheric air to a ~~solid~~ liquid almost

(122)



(123)

Make a vacuous glass box



boil it in hot Linseed oil while Exhausting use McLeod Gauge + run from 7 am till 6 pm – highest obtainable Vacuum – this chamber is to be used in expmts on retarding lines of force or Stress etc

Force

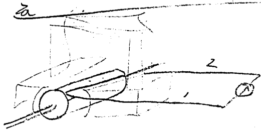
With spectrum tube End on and side heating tube – get Spectrum by gentle Heating say Iodide lead – Record Spectrum then heat little more get a second Spectrum – then so on until all the Iodine is driven off my idea is that Iodine is a mixture of Iodine Molecules + spectrum will change as higher heats are used to decompose the compound – P69 magnet be used

Edison

It may be necessary to put this tube in a metallic heated bath & use a Thermo to measure the different dissociations points— If this works with Iodine, Chlorine, Bromine, try it with Hydrogen use Palladium & get spectrum at several Exhaustions & temperatures, ~~also use~~

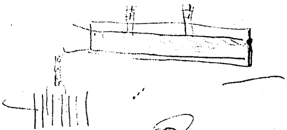
Edison

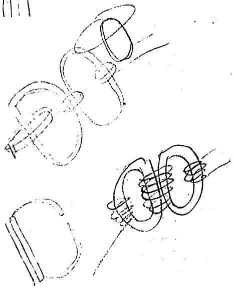
2a

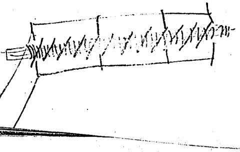


John Ott

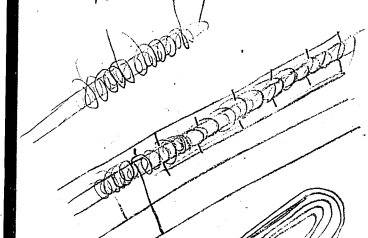
Use Hard rubber cylinder rotated in powerful field Resting on this near top is a rubbing wire with 2 leading wires— my idea is the rubber will be charged & will discharge & give a current through wire 1 + 2



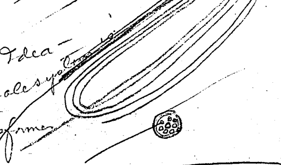


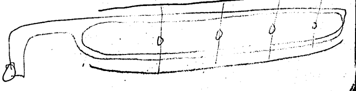


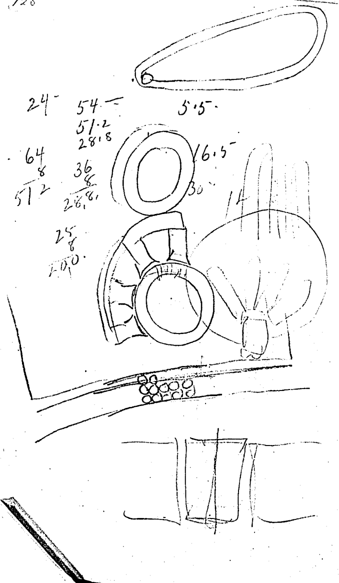
Nov 22, 80



New Idea —
The whole system
a transformer







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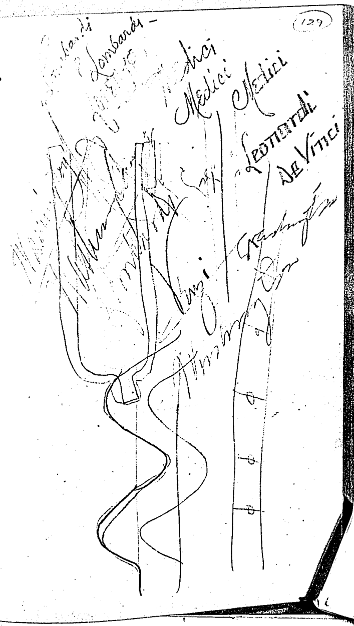

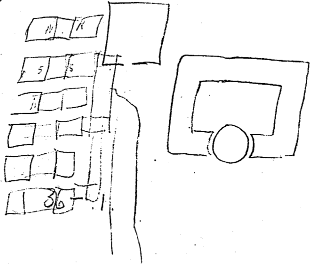

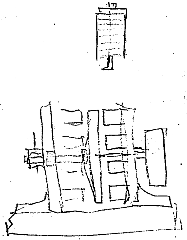

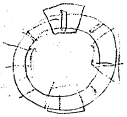

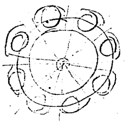

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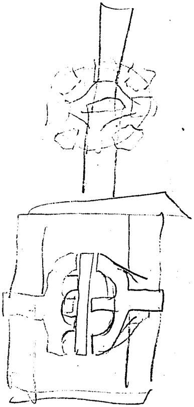

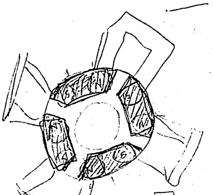
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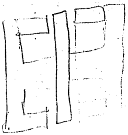

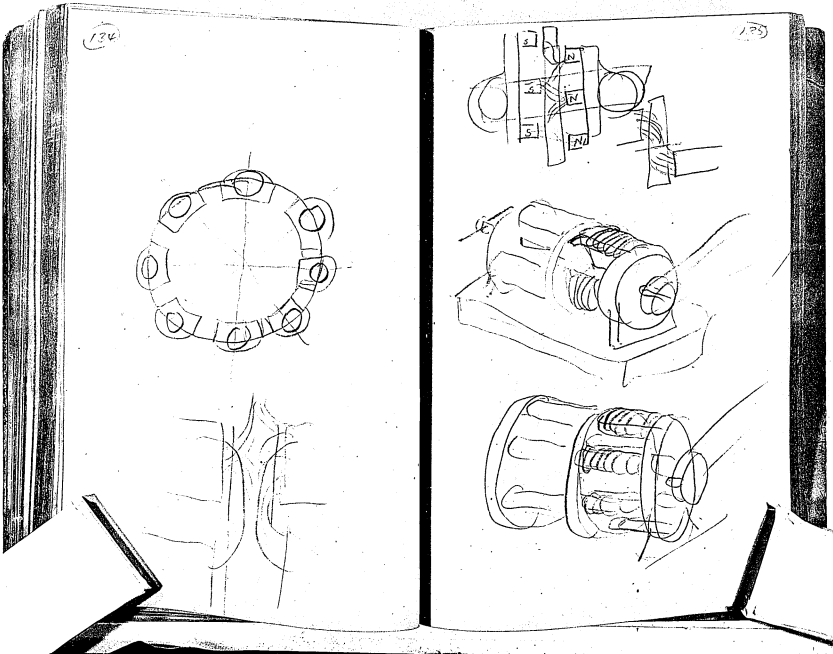

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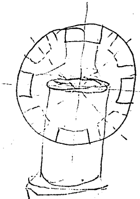

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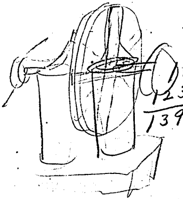

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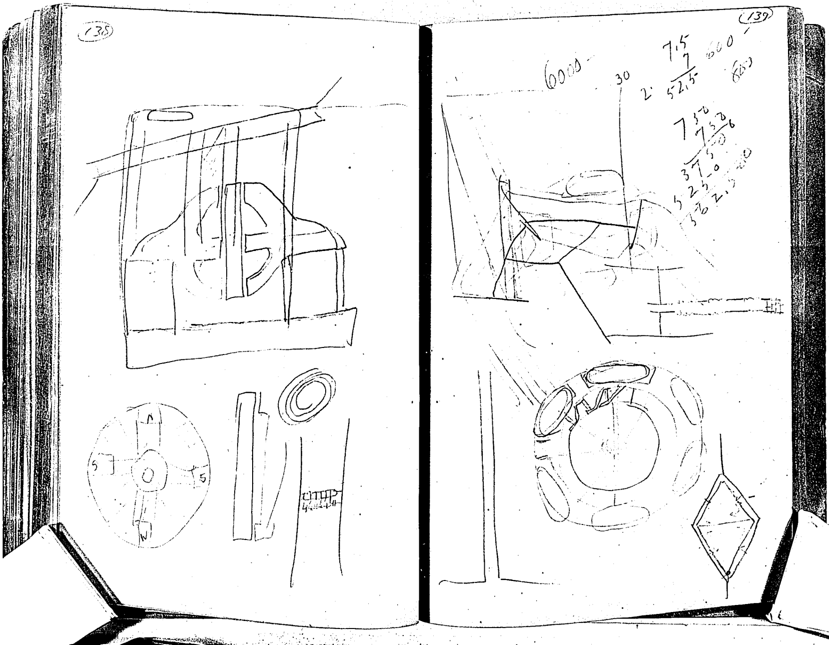

138

139

6000

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7
2 52.5

600
800

750
750
6
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5250
3750
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Time Expmt—

Put in Large bottle,
a sheet of every kind of
metal seperated from
each other & then fill
with Bisulphide Carbon
ditto another bottle Ter chloride of
Carbon & other Chl of Carbon & set these 2
bottles away sealed for
several years to see
if Diamonds formed by
decomp & crystallization
get some Iodide Carbon
also—

Chemist Edison

Watts says in some expmts on spectra of Carbon that with spark tubes no deposit of Carbon takes place with diminished pressure but at pressure atmospheric spark is white & Carbon set free — I think that Carbon fils could be deposited upon a dull red if in a Hydrocarbon vapor under 5 or 6 atmospheres pressure —

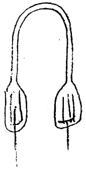
In Electrolytic experiments for the Coml production of various Chemicals

Note that any insulating liquid can be decomposed by great surface small distance & high tens

Schonbein says that all peroxides formed electrolytically are formed by Ozone — Especially Silver — Marshall to work this up — Chemist

---

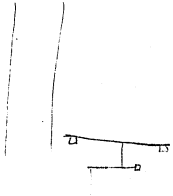
Welsbach hood replaced by falling Zirconium powder. perhaps under proper conditions the powder (very light) on an electrified base at bottom of flame may be drawn up through flame & fall back. Certainly with a Chimney a whirl operated by the heat could be arranged to do mechanical work stuff must be pass continuously the oxide — Work this scheme up

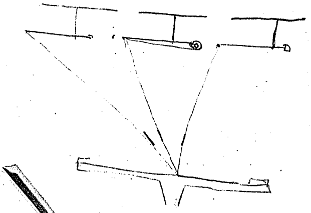


Bohemian Glass that will stand yellow heat with Capillary bore filled with dry gas ~~[illegible]~~ + transformers with sharp currents — also bore filled with fluffy Earthy Oxides.

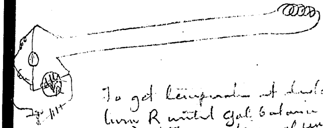
Marshall ~~Pyridine~~ Try some Nitrogen Hydrocarbons in Vac. The heating of filament probably produce a good residual + deposit

Edison to name these compounds





Telimeter



To get temperature at distance turn R until Gal balance Read of Temp in terms of units of Change of Resistance

Phonograph Nov 25 87

TAE

Hardrubber cylinder polished
Record by a rubber point increasing
area & strength of ~~elastic~~ friction on
surface represents increased
amplitudes — use a delicate
reproducing [illegible] & work by dif
friction so the Electrofriction
alteration dont seem to work
well on former Experiments —

for duplicating paper cylinder for
phonograph to make conducting
surface dissolve phosphorus
~~[illegible]~~ very small amount
in BiSulC or ether dip cylinder
in then at moment solvent
has evaporated dip in solution
Nitrate Silver - chemical Expt

~~Heckman + Fora~~

In compounded preliminary use 1017 well dried and distilled rod try — The anilines in H_2O — Dextrine, Caramel, Hard burnt sugar — Grape sugar — Milk sugar — Saccharine — albumen — blood + Egg — Catechin —

~~Heckman + T~~

Mix with 17 some photographers plumbago also after put on dust over & when dry burnish with brush —

After treatment with 17 + final Carbon put in gas tube with hydrocarbon + deposit on

---

Instead 17 — dissolve the Hard Cubean in hot Linseed + then let it dry by air — 6 days before ~~sanding~~ to final —

Chemist Marshall [illegible] — also Marshall

Silver carbamide when heated gives off ammonia —

Iodide Carbon .. Tetrachloride Carbon necessary to make it - Iodide Carbon decomposes slowly at ordinary temperatures but more rapidly at 200 fahr when exposed to air into CO + CO_2

Monosulphide Carbon a powder decomp by heat at 200 cent its made by exposing Disulphide to strong sunlight also by putting hot iron wire in sealed tube with Disulphide for 6 weeks See Watts = 3rd Supplement Pt 1 p 406 —

Tri Bromide of Silicon - is in crystals which sublime at 240 c This is good for depositing in filaments See Watts 2nd Sup p 1086

Chem - Mo [illegible]

Watts 2nd Supp p. 1215 –

Bromide of Zirconium – $ZrBr_4$ –
Volatile at heat of gas burner
good for depositing on
filaments –

Iodide Silicon Tetraiodide –
melt at 120°C boils 200°C
Sesquiiodide – melts 250°

Amonio-chloride boron.
$3NH_3\ 2BCl_3$ This may
decompose –

Chem Marshall Ext
notes

In 17 mix chloride Platinum - also Chl Iridium — also soak in Chl Iridium first then dry - then 17 ut
Idea to fill gaps by a good cond'r to make good contact in a crack -

Idea for photoghy red or heat end of spectrum

Coat a plate with material which at ordinary temperature decompose but do not below Zero — Now absorbtion of heat rays will raise temperature on certain points up to combining point & thus photogh lines of spectra etc

Dixon

Carbolate of ammonia for heating in Vac Expmts —

Carbolates of Baryta Lime & Earthy Salts having no water should decomp & give various HydroCbns —.

Chem News Vol

Picramic acid for a 1017 —

Chlorine passed thro aniline oil gives a Jar good for a 17

Cyaniline —

Watts Chemist

Curious — on heating Cyanide of silver it gives off Cyanogen & leaves paracyanide silver which is a grey porous very refracting mass which when rubbed with hammer acquires perfectly metallic appearance like Bismuth

Try for Thermo — Telephno — Etc —

Chemist

This paracyanide of silver Combines with Hg to form an extremely hard Crystalline amalgam

Azulmic acid is an interesting nitrogen compound of Carbon & work at it for a base for fils

Chem - [illegible]

Comenic acid - by manipulation gives a charcoal like glance Coal - ammonia dissolves it See Gmelin Organic Vol X p 384 also Comenate ammonia

Chemist

I think for fils The destructive distillation of various Organic Compound just short of Carbonization will give me a great number for instance Citric acid by heating at a certain point turns black & a little further gives an extremely lustrous Charcoal

(166)

(167)

Claim x

x by stopping short of Carbonization Solvents can be generally found for all residues & thus a large number of 17's can be obtained —

Boyer Kennys Room

See if it is possible to Carbonize Hair in asphalt, Linseed oil — Chloride Zinc etc not only hair but put a piece of any kind animal matter, Silk hair hair - albumen glue gelatin aniline crystals etc. use slowly rising heat in prelim chamber —

Claim Mucic acid

Mucic acid on carbonization leaves a charcoal with an almost metallic lustre, Gmelin V p 503 —

Saccharic acid – Des Distilln

After preliminary
+ H_2O driven off so there is
scarcely any O left it
might be acted on by
Chlorine at the same
temperature as it was
prelimgd at so as to take
the H out without forming
Hydrocarbons + those forming
porosity — good, 5/5

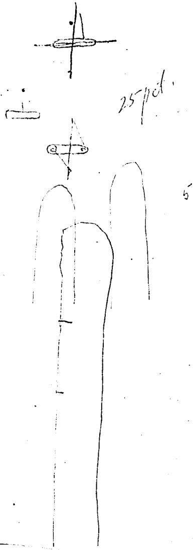
Elecn

Pont-Chl phos

Anhydrous Phosphoric acid
is Especcially valuable for
dehydrizing filiments as it
doesnt part with its O –
Like SO_4 + Carbonize – This
is good point boil fils in
F phos acid —

Cheap Manfall
making chem Carbon

(170)



(171)

All Nitrogenized organic compounds when treated with excess aqueous fixed alkalis in manner [illegible] their peculiar nature give off all their nitrogen as NH. 2 atoms H_2O take their place hence if this is so. hair horn etc boiled with an alkali should after treatment be capable of Carbonization [illegible] swelling or puffing

Bo— Kemp. 22

Carb Lime decomp at red heat in air will stand melting in a closed chamber where it is under pressure hence in my vacuum experiments its probable that it would decomp at 6 or [illegible] & other [illegible]

172

173

See Watts Dic 2nd Supplement
p 265 Pentacarbon Bisulphide
a solid + black Chem Manual

Have a continuous transformer
drawn out + made on basis
of a 10 ampere machine with
double surface velocity + thin plates
enclosed in iron box to act as
poles - box forming part field as a
1000 Volts pressure - big diameter
armature short length, work up to
saturation of cores - put it in
Centers if possible Agate if possible -
perfectly balanced)

[illegible]

also Larger one with manhole
boxes and feeders running in iron
down pole in tubes to transformer
in manhole - use 3 wire or
double transformer - in this case
put motor armature horizontal so
as to run in oil on agate
Centers -

Artifical fils — Edison

Carbon bases — First to be used to form a frame to prevent easily fusible carbonizing substances such as asphalt from running. The amount of carbon being small in proportion to the fusible carbonizable material. Second where the greater percentage of the whole is carbon the fusible material being used only to lock the particles together

1st Carbon to be very finely divided like Electrotypers or rather like Photographic plumbago —

1 : Carbonized cork
2 " Pith
3 " Cocoanutshell
4 Carbonized Cotton,
5 " bamboo filaments ground up
6 Lampblack Eddys
7 Telephone lampblack
8 Carbonized residue from Standard oil refin

9 Carbonized asphalt,
10 " Sugar
11 " Albumen
12 " Tragacanth

Edison

13 Carbon from action of SO_4 on various organic material - Sugar - Dextrin, paper, Cotton, Milk sugar - anilines, Oils -

14 Carbon from action Chloride Zinc on above organic materials.

15 From pine wood charcoal.

16 Tartaric, Citric Oxalic & other organic acids Carbonized also - from Tannin, [illegible]
~~17 Muriatic acid [illegible] Hydro~~

Material which is to form principle part of the fil 1st series -

1 Hard Cubian asphalt, in liquid with Carbon mixed & solvent evaporated, - prelimized predipped on pag 17

2 Hard Cubian with Carbon & - 20 pct Napthaline to grease moulded & worked hot. - prelimized & dipped 17

3 Hard C. + Coal tar
4 " Pitch of Coal tar
5 " Wood pitch,

I will only mention now materials to be got together as I can then work out propertas to suit results on Squirter —

All the analines —
gum Dextrin.
" Arabic
" Shellac
all the other gums
glue albumen - Tragacanth
Syrian asphalt. Anthracene Crude —
Petroleum Tar — Petroleum Pitch
Linseed oil, Castor oil - Olive oil Cellulose,
glycerine — ~~Mucic acid~~ ~~Comenic~~
Mucic acid, — Comenic acid,
Hydracuryclamic acid — anthracene
Crude — Colophthalin see Watts 2nd Sup page 1746 — infusible nonvolatile Hydrocarbon —

Edison

Monosulphide Carbon — decomposed at 200 C.

a great many Hydrocarbons pyrene etc
are carbonized by Sul acid — got this forming
~~Carbon~~ —

Clement Marshall

Notes Continued

Phlorizein ~~Watt~~ Gmelin p 17 Vol X

$C_{42}N_2H_{30}O_{26}$ – infusible carbonizes without fusion or volatilizn –

Rubian – Gmelin X p 35 –
leaves much charcoal;
ditto Rubianin p 56. X.
ChloroRubidian ditto X 62 Gmelin

Chem Material

Convolvulin – Gmelin X 154 – melts at 100 & can be drawn out into dazzling white threads resembling Motherpearl

Cyclamin – Gmelin X 200
Carbonizes without melting

Carthamin ditto – good!!
Gmelin X 202 !!!
Leaves ⅓ of its weight Charcoal

Haematoxylin only chars & leaves
large quantity [illegible]
Gmelin X 288.

Fat or wax of Shellac Gmelin X 3[illegible]
chars & carbonizes ~~Ent~~ Enter this in Chem III

Retene a HC for phonogm hardener -

~~P~~ Paracyanide of silver
melted & then silver
dissolved out leaves a
frame work of Carbon

Chem Marked

Bi-hydrosulphate of Cyanogen fuses & carbonizes leave large bulk charcoal —

Hydrocyanate of Titanic Chloride passing its vapor through Red ~~[illegible]~~ hot tubes deposits that Copper colored Nitride of Titanium good for Carbon filiments — Gmelin 2nd vol — 148 —

Sulphide Stilbene Carbonizes it is a powder which is often at 80 when heated slowly & becomes transparent there is [illegible] [illegible] [illegible]

Gmelin Vol 6 169

Salicretin Vol 6 231 carbon & leaves great quantity charcoal

Chas Wardale

(186)

(187)

Vol 6 Gmelin p 262

Sulphanisolide —
melts when carefully
heated but solidifies at a
higher temperature ? ? ?

Salhydramide Vol 6 p 345 —

Erythroglucin as a 17
good — Vol 6 Gmelin p 385 —

Japonic acid (Brad Block)
may work well for a 17
Vol 6 394 —

Chem Marshall

Mellitic acid this is a
daisy for filament Vol
4 Gmelin p 1

Vol 4 – p 16 –

Paramide – clay like – carbonizes ~~without~~ melts

Vol 4 p 252 Creatine

Very difficult [illegible] charcoal

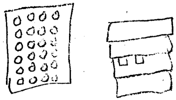
Have John Ott make

Some ~~½~~ one inch ~~[illegible]~~

slabs of Carbon with holes

thus

John Ott



Scratch no on each hole

which is ½ dia by ½ deep

weigh out equal quantities of

everything Carbonizable + then

Carbonize slowly + test the charcoal

for quantity Shrinkage + Combustibility

192

①	⑴.5	②	2.5	3.	3.5	4
III	I	I		II	I	

27000
9000
5000

193

Marshall

Run off 20 new lamps get high vac & seal without heating fil then set up at 240 cp hp & take cp. regular

---

Cerium

Millers Inorganic p 555
Cerium metal easily obtained by electrolysis. Easily drawn in wire - etc. Make 10 lbs metal.

Miller Inorganic 664

Chromium requires higher temp than plat to melt.
Chromic
" Hexafluoride Chs is a gas formed by mixing 4 pts Chromate lead 3 pts fluorspar & strong SO_4 blood red gas — deposit on fil

Marshall

~~at [illegible] Miller p 6-77~~

Pentchloride of Molybdenum
Melts 381 Fahr gives dark
brown vapor — good for deposit
on fils — Miller Inorganic
p 711.

Tungstic Hexachloride
Melts at 527 Fahr & boils
656 - gives vapor -
Miller 714 —

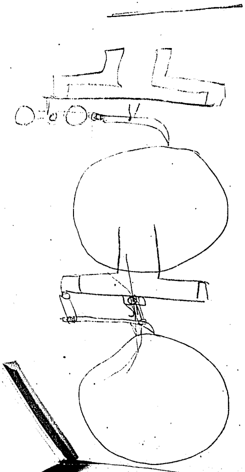
Tungstic Pentchloride
Meltat 478 Fahr

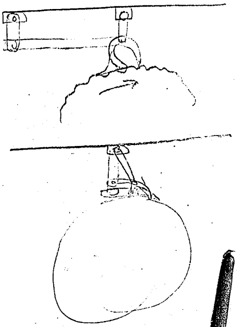
to make
chem Marshall
Marshall to
deposit on fils

Try the Experiment in a Lamp with Red Oxide Hg — also Perox Lead to see if pure dry Oxygen attacks filament

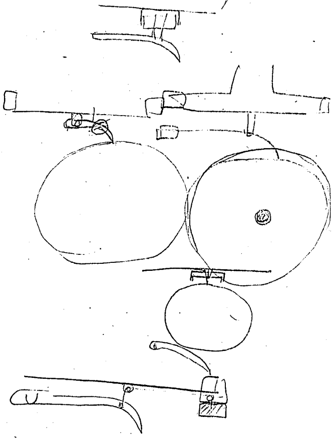
---

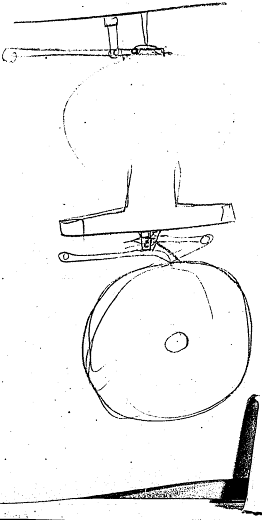
Osmic Tetrachloride is volatile, with this Osmium will probably be deposited as most infusible element known except Carbon —

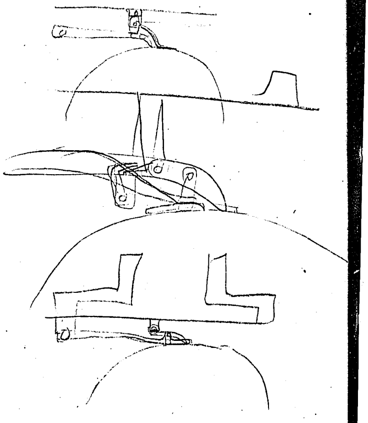


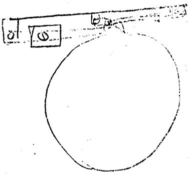


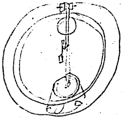
Sept 3 1888 Phonogh

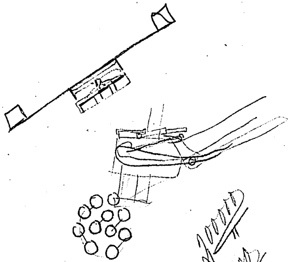








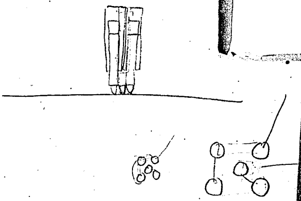


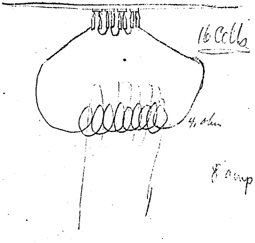


20000
11

2000
11

12
17
84
12
204

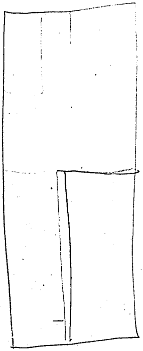


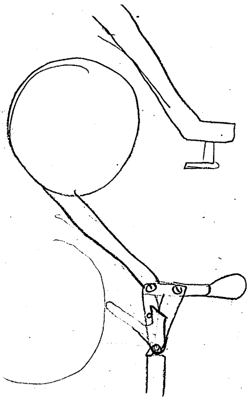


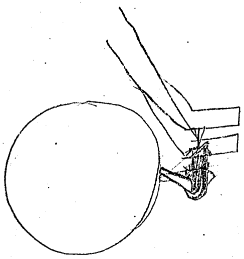
16 Cells

4 ohm

8 amp —







~~3~~266.
266
532.

2/2000 amp
pair 1000 hp —

2 pair

4400 1000
33000 / 1000.) 4400000
3300000
1100000
~~9~~ 990000
~~12~~ 1100000
(133

16 / 2000
16
40
32
80 (106

40
20
80

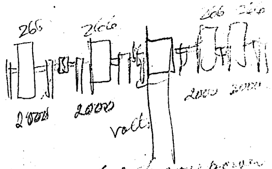
20

15 / 2000 (133
15
50
45
50

4400 / 8000
35200000
33000) 35200000
3300000
220000

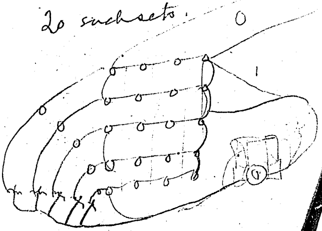
133.

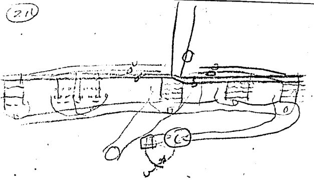
20 pair of 2 each 2000 amp machines or 266 hp coupled together & then coupled



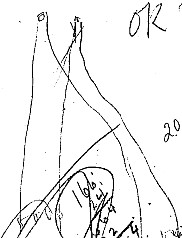
1060 horsepower

20 such sets.





OK Magara



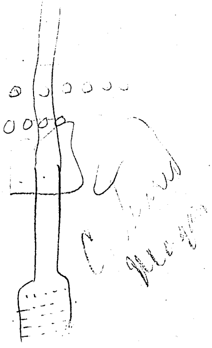
20000

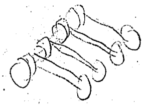
166
160
9960
166
265.

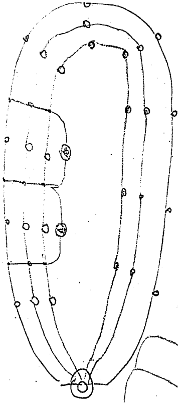
166
664
332
3984

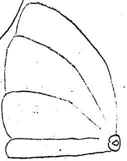
$224000 ehp 1064 hp

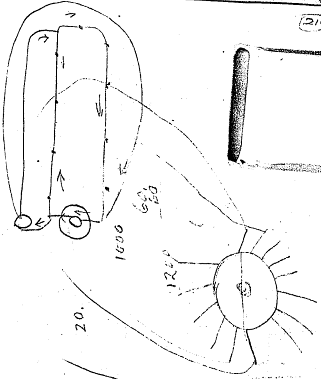
$226800.000 for dynamo

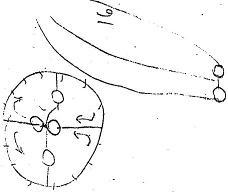


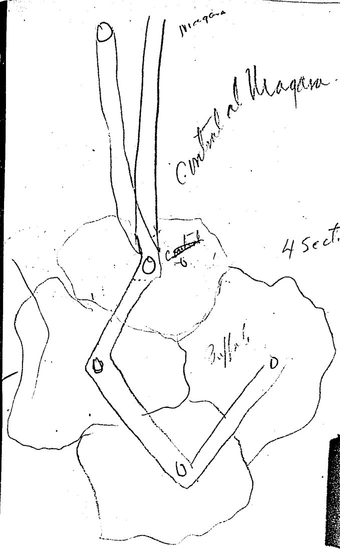






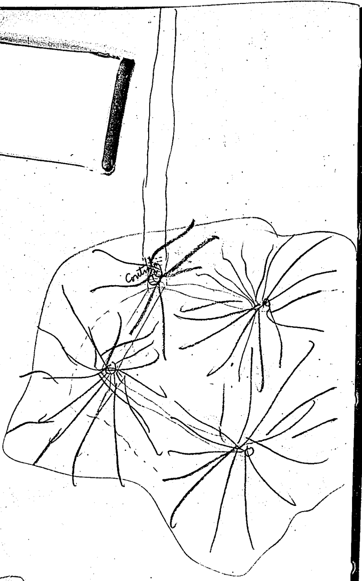

600
60
1600
1200
20.


16



Control at Niagara.

4 Sections.



drop in valts divided by
the Current in ampares
gives the total resistance

1 Cir mil foot has 1.0 ohm R
1 " " $\frac{3}{1,000,000}$ lbs.

2343)10000(4.27
9372
280

333 000

100000
9372
6280
ohms 6864
15940

18
5000
9 00,000

6400 valts
1280 valts
2343 amp

1000)6400(

2343)1280.000(.546
11715
10850
9372
14780

2343)16000(
744

4)6400
81 600

$7\frac{1}{2}$ amp 1 horse power 100 valts.

7.5
2 0000
150,000,
1

750)2000(2.66
1500
5000
4500
500

7 amperes 100 valts
1 hp

5)8000.
1600 valts drop

5)6400
1280

44
7
308
100
3,0800

44
8
352

3 lbs to foot

44
.750
220
308
33000

2)37500
18750

266
804.

2.00.	150000.
200	75000
400	37.500
800	18.750
1600	9.375
3200	4687
6400	2.343

2)9375
4687

1 cm 900 000 ohms
450 000
2 225 000
4 112 500
8 56.250
16 28 125
32 14 062
64 7.031
128 3 516
256 1.758
512 — 879
1024 — 440
2048 — 220
4096 — 110
8192 — 55
16384 — 27.5
32768 — 13.75
65536 — 6.87
131072 — 3.435
262144 — 1.717
524288 — .8581
104848 — 4.29
2,096,976

1.717)27.5
13.7

2)13.75
6.87.5

2)6.87
3.43.1

2)3435
1.717.1

2)1.717.1
.858.1

2).858.1
.429

1000 Volts
drop in 6400 –
2343 amps

18
6
8

17
6
2

20000
7
62)140000(2254
124
164
~~124~~
360
310
500

3)2,096976
698,992

2254
62
4508
13524
139748

29

698992 lbs Copper
17 cents
4892944
698992
$118,828.64
100

~~$100~~ Copper

$118,828,

16 pct drop

Earth return

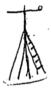
226

Instead of 4 ~~D~~dynamos
of 2000 Each use 6000
Volts, & 2 dynamos
of 300 Volts Each —
or 40 double dynamos
of 500 hp each pair at
$24 per hp inclu 17 pct loss.
$12000. per pair 40 pair
$480000 — total Rope belting 500 per pair
$20000 — ~~found~~ Station
appliances, Extra dynamos
Regulators $35000.
Total without building
at Niagara $535000.

6
24
66
332
398

900 000
40 | 90 000
80 000
10 000
1125
80
89600

227

Poles  2 sets.
80 feet apart or

1125 — or double 2250
60 $60 each
135,000

5 miles underground high main
or at $5. per foot. 130,000

---

40 double high Motors
$480,000 — belts. 20000.
40 Double low Dynamos
480,000 — with bldgs etc
Regulating apparatus bldg
etc 35000 — Total
at Buffalo

480000
480000
55000
1015000

52[illegible]
24[illegible]
13[illegible]

Niagara
wires

8.5
4 $\frac{1}{4}$

4 | 115 2.9

2500
24
10000
5000
60000
1000000

1 inch - 240 lbs strain
2000
lb 333 cu feet to lb.

80 feet. 166
10

500 2500
4
10000

62500 | 20000000 | 32
18750
1250

500
500
25000
1

250
250
12500
500
62500

Total.

Niagara	535000
	135000
[illegible] poles	118000
Wire.	130,000
5 Miles Underground	1.015 500
Double Appat Bu	
	1,933 500

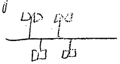
~~Cost of~~

~~Poss 1 inch Cop~~ no

two 1 inch rods. -
or 8 1/2 inch
32 $\frac{1}{4}$ inches wires last
practicable

230

Bldgs. ~~60~~ 4 double dynamo



50 ft wide — 24 feet single dynamo on side or
20 - spaces 24 ft wide. or 6 bldgs
500 feet long — Cost. 35000. without
foundations for Dynamo say 25000
for foundation make it 60,000.

at Buffalo. with 3 stations.
Cost stations with 45 motor + ~~[illegible]~~ 45 dynamo
dynamo required. Dynamo upstairs motors
below. Space for 45 double dynamo
or 15 in each station. Bldg 25 × 100
answer. Cost, with real Estate.
33000 Each total 100 000,

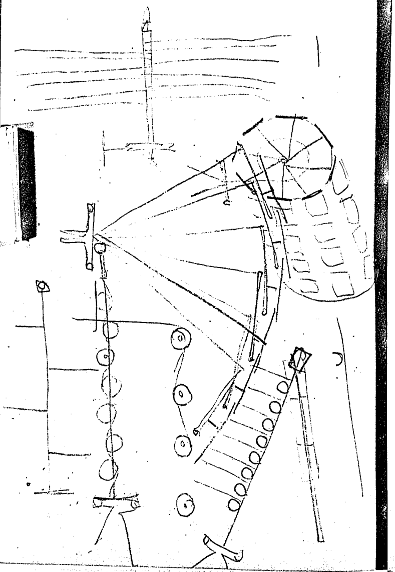
These items added to the
1,933000 — with 5 Extra M & D
60 000
100 000
60 000
2,153000

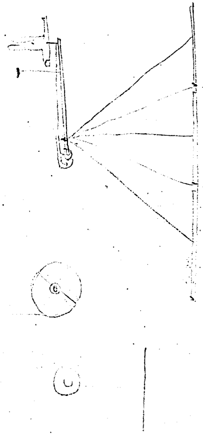
231

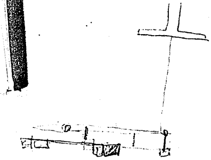
Total 2.153,000.
75 000 Labor installing
Grand Total. 2,228,000

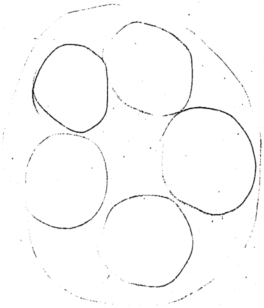
Depren at. 3 pct. say — 67000.
Insurance on 1,500,000 at 1¾ — 11250
Day payroll niagara - night. 4 places - specialists } — 36500
46500
at Buffalo.
General Manager — 6000
Presdt. — 5000
Secy & Treasurer — 5000
Electrician at Bu — 4000
" Niagara — 4000
~~[illegible]~~ 3600.
Repair man on line, 20000.
~~Motor oil~~, on 600, bearings. — 2500
waste — 2800
Brushes 7500 ~~28~~ 1800 per year 50 3
Repairs ~~[illegible]~~ lines — 18000.
212550

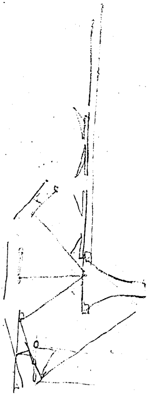
4 9/0
45
8000
360000
45000
55
600
33000
112
17
20000
340000
25
400
10000
40
300
12000











10

200 hp -

6

6 200 / 2700

2 200 / 2700

If sold for 2000

7600

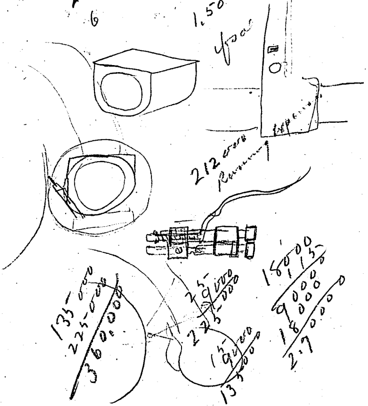
1

(131

15 per y

1,50 month

If so



135 000
225 000
360 000

25
9000
225 000

225

15
9000
135 000

18000
115
9000
0000
18 0000
2,7 0000

Niagara

Running Expenses 212 hours deliver 18000 horsepower net.

If sold 10 hours daily at an average of 15 dollars per year per hp — net 2,70,000 deducting Expenses ~~& add~~

To total ~~investment~~ 350 000 for power ~~iron~~, The Customer furnishing their own motors

The total investment is

2,2 28 000
3 50 000.
2,57 8 000

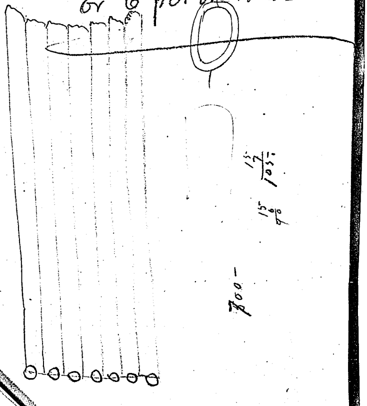
Recpts 270 000

Running Expenses. 212 500
57 500

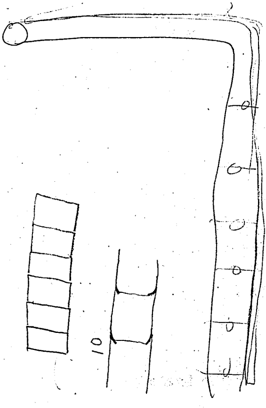
If 9000 is sold to large Custom ~~at~~ 15 & 9000 for 250

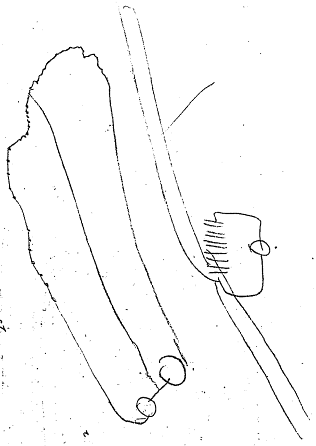
Then we have 360 000 Reeps
212 000 Sxp
148,000

or 6 pct of bands —



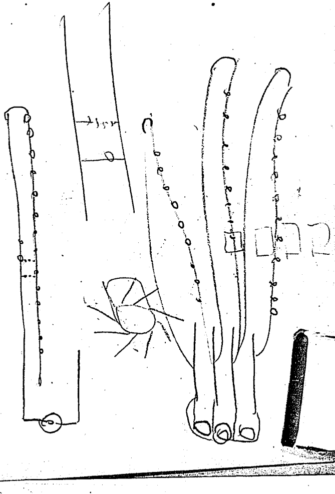
Triple

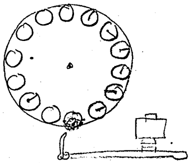


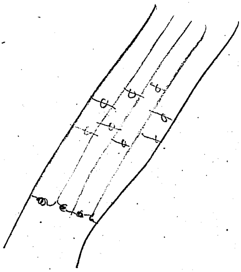


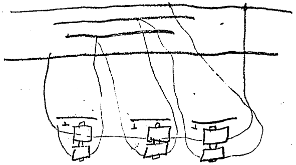
25 - Lumps -

15









70.000-

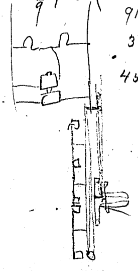
65000.
14

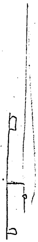
260000
65000
910000

9100*

3250 -

4550





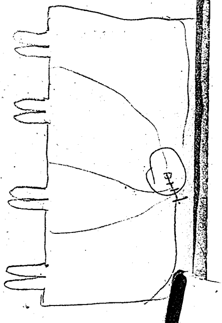
20000

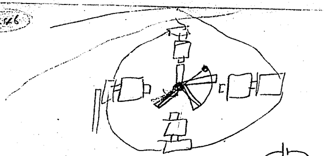
/60000

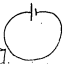
75

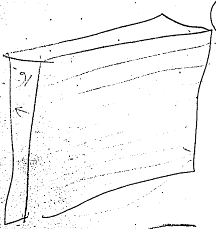
15
7
3

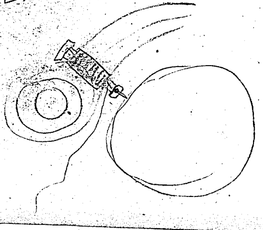
400 ½ -

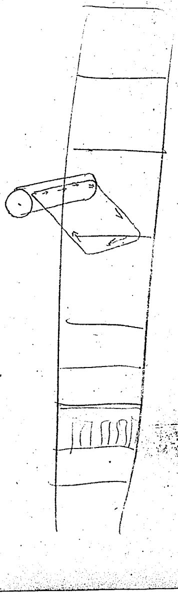


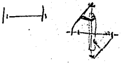


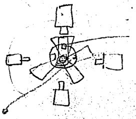


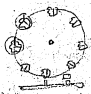












Notebook, N-87-11-21

This notebook covers the period November-December 1887. All entries are by Edison. The book contains notes and drawings regarding a repeating device for the phonograph. The spine is labeled "40." The pages are unnumbered. Only 5 pages have been used.

XE-172 N-87-11-21

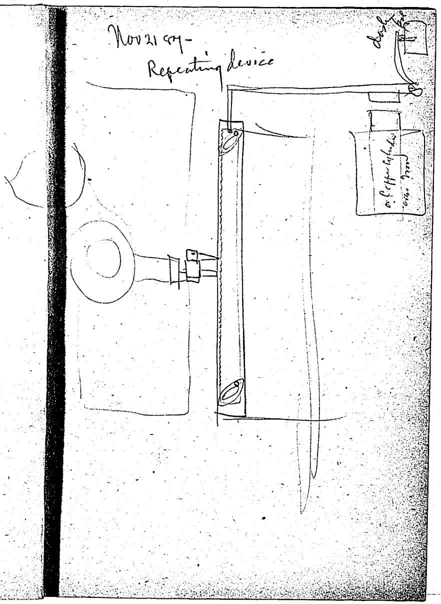
Phonograph —

Edison Laboratory

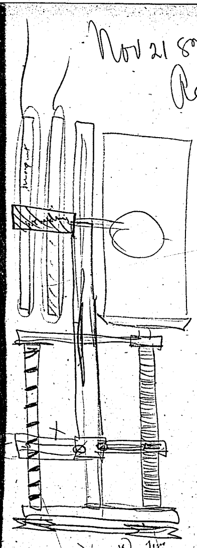
Orange NJ

Nov 21 1887

Nov 21 87 -
Repeating device



Nov 21 87
Repeating device
TAE



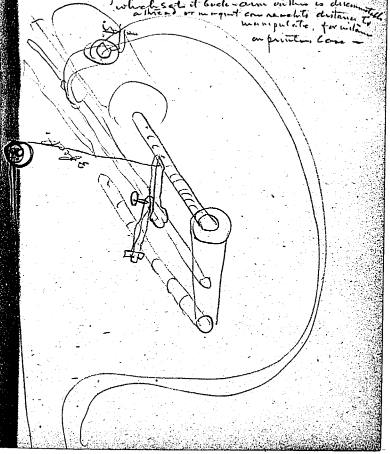
Magnet to lift up throwing X on reverse thread

Thread (coarse) in opposite direction

belt

Nov 21 87 TAE

Good repeating device — raising lever throws it into gear with Coarse reverse screw which sets it back — arm on this is disconnectable a thread or magnet can be worked at distance to manipulate, for instance on printers case —



Dec. 1. 87.

Compounds for wax cylinders for the Phonograph

Notebook, N-87-12-08.2

This notebook covers the period December 1887-May 1888. Most of the book consists of tests made on Lalande batteries by an unidentified experimenter. At the beginning of the book are 10 pages of notes by Edison, dated December 8-10, containing instructions for chemical experiments on lamp filaments, phonograph cylinders, magnetic iron ores, and other materials. Following Edison's notes are 3 pages by Arthur E. Kennelly, possibly listing laboratory projects involving technologies such as the telephone and the pyromagnetic generator. The front cover is labeled "Lalande Battery." The spine is labeled "029.4." The pages are unnumbered, and the book has been used in both directions. Approximately 150 pages have been used.

The Lalande battery test notes have not been filmed.

Orange N J Dec 8 1887.

Take say 25 lbs Hard Cubian asphalt, and seperate all the different Hydrocarbons etc as far as possible by means of Solvents.
It will be necessary to first disolve everything out by say hot turpentine then successively treat the residue with, Bisulphide Carbon, Benzol, Ether, Chloroform, Naptha, Toluol, Alcohol, and other probable Solvents - after you can go no farther - distill off all the Solvents so the asphalt material has a tar like consistency - Be sure all the ash is out of the Turpentine portion, now after distilling the turpentine off act on the residue with all the solvents

That were used on the residue - using for the first the solvent which is least likely to dissolve a great part of it. By thus manipulating the various solvents you will be enabled probably to seperate the Crude asphalt into Several distinct hydrocarbons - put each in a bottle after it has been dried & label the bottle with the process etc so we may be able to duplicate it also give bottle a number & describe Everything fully in note book —

Orange Dec 10 1887

Destructively distil the following substances down to a point just short of Carbonization so that the residium can be taken out of the retort, powdered and acted on by all the Solvents just as the Asphalt in previous page— The distillation should be carried to say 600 or 700 fahr but not continued long enough to wholly reduce mass to Charcoal but always run to blackness— Seperate the residium in as many definite parts as possible bottle + label + keep accurate records as to process weight, etc so a reproduction of the Experiment can at any time be made;

Gelatin 4lbs— Asphalt Hard Cuban, 10lb
Coal Tar 10lbs or pitch— Wood Pitch, 10lbs Syrian Asphalt 10lbs Bituminous Coal 10lbs—
~~As.~~ Cane Sugar 10lbs— Glucose 10lbs— Dextrin 10lbs

10 lbs Glycerine — 5 lbs Tartaric acid —
5 lbs Gum Guiac, 3 lbs Gum Amber,
3 lbs Gum Tragacanth, 1 lb Aniline Red
1 lb Aniline Oil, 5 lbs Crude Anthracene,
10 lbs Petroleum Pitch — 2 lbs Albumen from
Eggs — Tar from passing Chlorine
through 2 lbs Aniline Oil — 5 lbs Citric acid,
3 lbs Sawdust of boxwood — 5 lbs Starch
3 lbs Shellac, 5 lbs Gum Arabic 5 lbs Castor oil
~~Pyrene carbonized by heating with~~
~~Sulphur~~

Orange Dec 10/87 —

Heat with Sulphuric acid the following to obtain black carbonaceous residue which shall be well washed & freed from acid & bottled with full records

Anthracene, Pyrene, Alizarin, Rosin,
Turpentine, Napthalin,

In the seperation of Magnetite from The Crystals of phosphate of lime in Iron ores the necessity arises of powdering the ore — in the form of powder the ore cannot be used it is necessary to get some cheap binding material to fasten it together in lumps so it can be thrown in the blast furnace & hold together there until the reduction takes place, Lime can be used but as this requires a flux it is essential to add something to the lime say Clay, Silica — etc. Try various binders — Even Coal tar pitch clay & Lime could be used

A black deposit forms on the inner sides of Electric Lamps — I want an analysis (acurate) quantatively made of this, the black from say 1000 globes can be collected by breaking off the tips & allowing warm Hydrochloric acid to Enter, this seems to loosen the films & they can Easily be collected

You might make some qualitative test with different reagents on the films while on the bulb by pouring in the reagent heating Etc =

~~Take 20 lbs Hardest paraffine &~~
~~distil of until but 5 lbs~~
~~left = I want to get very~~
~~hard paraffine -~~

Make 1 oz of paracynide Silver
in Lump form if possible — it has
a metallic appearance, if impossible
get it in Lump keep in powder
bottle,

Make 2 oz paracynide Silver
Amalgmated with Mercury it
makes a hard Crystalline amalgam

Extract by any known means all
the hydrocarbons possible from
5 lbs Common Lampblack
put in bottle,

Make 1 lb Metallic Cerium by the Electrolytic method ask me for the Cerium material

---

Make 1 ℥ peroxide of lead by Ozone — ordinary & doesnt make the same quality of peroxide as ozone —

I desire to get a conducting surface on the wax phonogram — Disolve phosphorus in small amount of Bisulphide Carbon or Ether, dip cylinder in it. then at the instant solvent has evaporated dip in Nitrate Silver — Try Variations this Experiment

using one pole of platinum wire,
say .040 diam- and the other a
wire which has a great affinity
for the element combined with
Carbon Try the depositing of
Carbon on the platinum by regular
electrolysis, arrange the tube
containing the electrodes so you
can heat in Sand bath if
necessary - also arrange to try
experiment in Sealed tubes, use
100. 200 & 1200 Volts if liquid
is poor conductor - The conductivity
of all liquids increase by heat.
Use alone & in mixtures with themselves,
Bisulphide Carbon, Bi- ter & tetra Chloride
Carbon - Iodide Carbon. all the Iodides of
Carbon all the Bromides of Carbon.
Melted Napthalin, pyrene, pure Melted Anthracene

.Melted Hard Cubian asphalt,
Turpentine, Aniline Oil—
Melted Monosulphide Carbon— Melted.
Mellon — Iodoform ~~& others~~ you may
think off
put Electrodes very close together if
you find resistance high — ..
using 1200 volts have high resistance
inserted & also a safety fuse ...

CuS_4

(1) [illegible]

(2) [illegible]

(3) Telephonic

(4) [illegible]

(5) Pyrogenerator

(6) Di[illegible] different heater [illegible]

(7) [illegible]

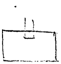
Cu	8
Fe	1

The current passing thro a track [illegible] on periphery conductor generates vibe

8)

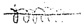
Arc li[illegible]

9)



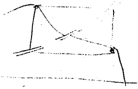
Chalk [illegible]
no light [illegible]

10)



Iron wire
surrounded by
wire wound on
iron core

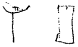
11)



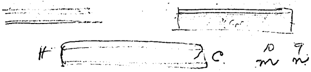
12)

Long iron wire

13)



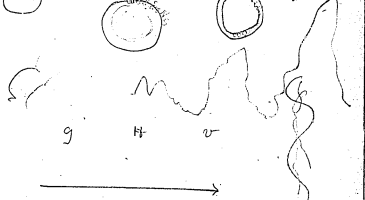
Tellurium [illegible] H.



$\overset{10}{m}\ \overset{9}{n}$

$\frac{mn}{2}$

$\frac{10 \times 9}{2}$ 45



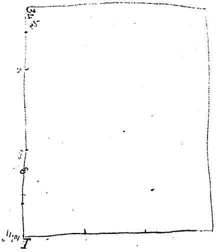
⇒ 1 ampere 1,000,~~[illegible]~~

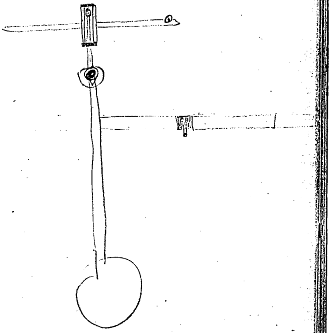
n

13 $\frac{13}{20}$

33 × 32
32
96
99
105,600

16) [illegible]





100 300 300

| 0.5 1.2 2.8 [illegible] 4.? 5.? 34½

20 50 50 50 50 50

< 10 0.1 1.2 2.5 2.8 3.11 4.2 24½ 5.1

< 10 1.2 2.4 3.5 4.2 4.8 16.2" 4.11

← 10 1.11 3.8 4.11 5.8 6.8 16.3 [illegible]

305

10.11 10.6

9.34
7.96
17.30
8.65
15.00
6.35

Notebook, N-87-12-10.1

This notebook covers the period December 1887-November 1889. All entries are by Edison. The book contains drawings and several long notes relating to filament experiments. There are also phonograph drawings; notes on battery solutions; and notes, drawings, and cost calculations regarding ore milling and hydroelectric power production at Niagara Falls. On the inside back cover is a list of points to include in an electric railway caveat. The pages are unnumbered. Approximately 120 pages have been used.

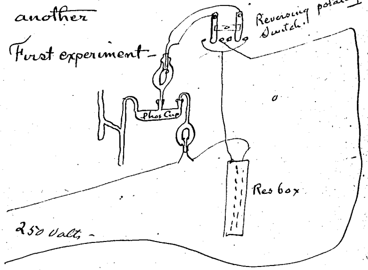
XE 172 N-8712.10.1

Orange Dec 10 1887 (Edison, T.A.) 4

Lamp experiments -

New process for coating the filiment in the lamp with a deposit of very Shiny carbon by means of electrical Carrying from one filiment to another

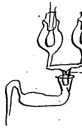
First experiment -



Both lamps are in series, by using a
low vacuum, so low that the close
hugging blue disappears and goes up
on the carbon, then the deposit will
take place on one side of the carbon
by reversing the other side can be
deposited on. This carbon comes
by electrical carrying from the
other lamp. With a high vacuum
the blue spreads out on clamp
as vacuum gets lower it hugs the
clamp closely, with a stiff
lower vacuum (ie) poorer vacuum
part of the blue goes up on the
carbon near the clamp & with
a stiff poorer vacuum it can
be made to run up over 1/2 the
filament. — With two filaments

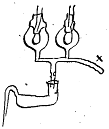
in the globe both in series the whole of the carbon deposited on one will come from the other, while if only one filiment were used one side would be injured for the benefit of the other & no benifit would be obtained — as it would be expensive to put two filiments in the globe so as to use one for depositing on the other, I want to ascertain by experiment if the filiments can be seperated in different lamps & the deposit still take place through the narrow bores in the Exhaust tube, you will also ascertain if making one or the other lamps the brightest produces any better results —

The poor vacuum can probably be obtained but not heating either Lamp until a moderate Vacuum is obtained and then running them up quickly — If the pumps exhaust the air too quickly to get any deposit then arrange the lamps thus



seal off without heating filaments, the air that comes from Carbons may be sufficient,

If this doesnt answer — arrange lamps thus



x is a tube containing Cyanide of Silver after sealing off the lamps you

Can manipulate the vacuum that is to say cautiously reduce the vacuum by gently heating the Cyanide, but before doing so work the lamps up on the Res box until you have reduced the Vacuum by excluding the air, This will give you a blue halo on clamps if it doesnt run up on Carbon you can then heat the cyanide cautiously watching the blue until it disappears up on the Carbon, then keep on Current for say 1/2 hour & then take it off & notice if one side or the whole of one filament looks more shining than the other — If one shows only a shine near the clamp on one side, then the Vacuum is

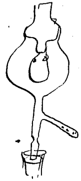
not poor enough and the Cyanide
must again be heated, The 2nd
heating may have to be higher
to drive off the Cyanogen —
You better make say 3 this way
& if it fails - then use instead
of Cyanide of Silver - Use
in tube. Peach blossom Colored
Sesquichloride of Chromium this
gives off Chlorine by heating
If this tried on 2 or 3 lamps
fails - then put in tube.
Silver Carbamide which gives on
heating ammonia —
If these two lamps do not work ~~make 1/2 doz~~
~~lamps with two filaments using~~
~~paste~~

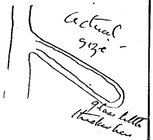
Cut the current of and manipulate
one to get a deposit on one side,
at Menlo park Our vacuums were so
low at one time that out of 60
16 cp lamps set up at 40 candles
over 15 of them after a few hours
showed one side dead black while
the other side was like polished
silver This shows that it is
possible, but whether it is
possible to cause this carrying
to go so long a distance from
one lamp to the other is the
object of the Experiment, by
using two filaments they act
as one long filament hence
one filament will be coated
while the other will get
black one acting as one side

when the vacuum at Menlo in those
50 lamps was a little better then
the deposit of carbon took place
on the clamp which was soon
Covered with bushy lamp black like
Carbon. so you see there is a
critical point in this experiment,
If you succeed in accomplishing
the deposit Either by two separate
Lamps or two filaments in one
Lamp - you should make 1/2
doz + then put them back on
pump & get high vacuum
+ set the shiny carbons up
for a life test,

Orange Dec 10 87 —

Make 25 Regular lamps new with paste clamps & side tubes thus





Run them to high vacuum work filiments in the regular way put Cyanide of Silver in side tube — heat this only gently to drive off any water, but not high enough to break tube up much — then seal them off — after they are off divide them in 5 series of 5 Each — Run these up to

say 50 candles in photometer
& so you get a blue
then heat the Cyanide tube
until the blue appears if it fails
to appear at 50 candles — If you
can do it at lower cp than 50
do so [I want to never go
above normal after I have the
Cyanogen gas in Vacuum — If
you run too high it will
decompose Cy & deposit Carbon
Cyanogen takes a very high
incandescence to decompose — very
much higher than a hydrocarbon
hence I hope to use it as a residual
at normal cp without decomposing
it.] Then keep heating Cyanide
until the blue is rather close
to clamp (not spread in a ball)
do this to each of the 1st series

To the 2nd series. go through same process but heat cyanide until blue is a close hugging one & small —

To third series continue this further until 1/2 the blue is on clamp & half on carbons

to 4th series heat until all on carbon

To last series heat until the last action takes place & considerable beyond —

Do not hold the lamp at the high Cps only for an instant at a time so you can see where the blue is —

Set all the series up at 16 Cp & take C power every day on all —

Duplicate all these Experiments Except use in side tube, Sesquichloride of Chromium -

Duplicate again using Hydrogen the same as we used in Howell Room when Barker was there,

Duplicate again using an anhydrous Bromide of some metal which on heating gives off only Bromine.

Note - perhaps a U tube with mercury could be attached to Each lamp & thus accurately measure Vacuum - or a stop cock & U tube on pump could be used with large heating tube ~~by [illegible]~~ suit your own ideas as to convenience -

Orange DEC 10 1887

Experiments on depositing on filiments materials other than Carbon—

Use lamps with side tubes and work them regular way & high Vacuum then seal off & by heating the side tubes drive off the compound or compound gas. while the filiment is brought up to various incandescences to decompose the gas & deposit the solid ingredient—

Make 3 lamps each with following substances—

Tri-bromide of Silicon,
Crystals which sublime at 240 Cent.
See Watts 2nd Sup P 1086

Bromide of Zirconium $ZrBr_4$

Volatile at heat of gas burner - Watts 2nd Sup p 1215

Iodide Silicon, tetroiodide, Melts at 120 Cent, boils, 200 Cent.

Sesquiodide of Silicon Melts 250 C

Ammonio-Chloride, Boron —

Hydrocyanate of Titanic Chloride:
This deposits Nitride of Titanium which is a non conductor & infusible — See Gmelin Organic Vol 2 p 148 —

It may require very high incandescence to deposit some of these Compounds — some of them may reduce the resistance of the filament greatly — what I want is brilliancy of surface —

Hexafluoride of Chromium —
Vac. in side tube. 4 parts Chromate Lead
3 pts fluor spar 150 mesh each & ground
together & 8 parts strong Sulphuric
acid — heat after Vacuum obtained
& blood red gas comes off, but perhaps
you wont notice gas in Vac
Keep the filament burning rather high
while gas coming off as I expect
the gas will attack the glass, while
the dry fluorine resulting from the
decomposition does not touch glass.

Pentchloride Molybdenum Melts at
381 Fahr gives dark brown vapor
deposit Molybdenum on filament,
have you Brother make it

Tungstic Hexachloride Melts at
527 Fahr & probably Much lower
in Vacuum — gives vapor Tungsten
deposit on filament, Have your
Brother make —

Tungstic Pentchloride melts at 478 Fahr— ~~Have~~ your Brother make—

Osmic Tetrochloride is volatile, See if you can work it — Osmium is the most infusible Element known except carbon — If we could get a shiny coat of this on filament we would get 4 more lamps per hp— Osmium is not fused in the Oxy-hydrogen blowpipe—

See if dry Oxygen attacks the filament, use Red Oxide mercury in side tube get high Vac & then put filament at 16 cp & heat oxide — O is driven off—

I want to continue experiments on the depositing carbon on filiments in tubes, When you are ready speak to me and I will have some well made tubes of iron made with a bottom welded on and a fine thread cap in the tube you place, Charcoal always of same quatity. Then use different quantities of the same material to get diferent pressures & try various heats — I find that under pressure most hydrocarbons decompose readily at a dull red (ie) at a lower temperature than in air —

Try Mellon — Have your Bro make —
Monosulphide of Carbon, C.
Sulphur 20 parts Albumen from Egg 80 parts mixed together —
Aniline Oil — asphalt, hard Cuban,
Anthracene (purified) — pyrene,
Aniline red — Napthaline,
Parafine

from the best results, select one & then we will put 50 new lamp filaments in deposit, and put in lamps with paste clamps & run a Curve

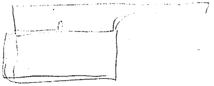
---

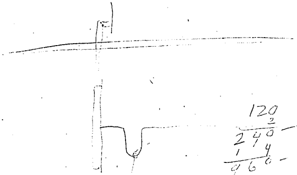
Run off 25 Reg new Lamps with paste clamps with high Vacuum but do not heat filament until the lamp is sealed from Vacuum pump — Then set 10 Lamps up at 16 Cp — & take Cp every day also set up 10 at the rate of 240 cp per hp & take Cp. Every day —

Arange with Mr Ott to have a heating Stove with new Lamp rack to bake lamps before putting on pumps — also get from Lamp Factory their old Exhaust pump & box for taking water out of Lamps after baking — have it set up

Bichloride of platinum absorbs mercury vapor — I suppose the Chlorine combines with The Mercury and leaves platinum — Try some of this in a dish in a vessel with mercury well covered, see if in time it will absorb mercury Vapor —

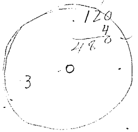
For depositing Boron on filiments which is a substance like carbon & Equally infusible — use Boric chloride your Bro can make the dry powder as described in Watts Dec 2nd Supplem page 207 — This powder on heating in a side tube in lamp will give off Boric Chloride which will require the filament to be run up to a very high incandescence to decompose —





120
2
240
4
960

6
18

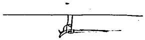


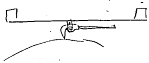
120
4
480

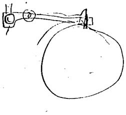
Sept 7 88

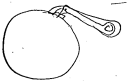
Phono

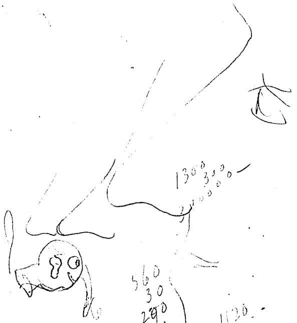
TAE











1300
3500
000000

560
30
290
50
160
150
1150

1120

1500000

560
30
1680
762
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550
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762

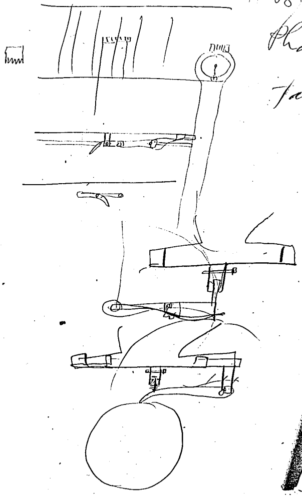
1770
120
35400
1770
212
208

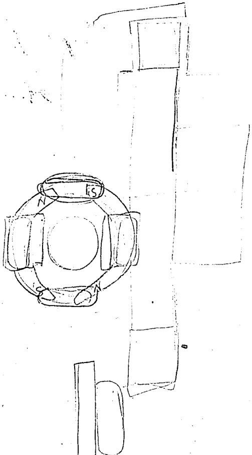
120

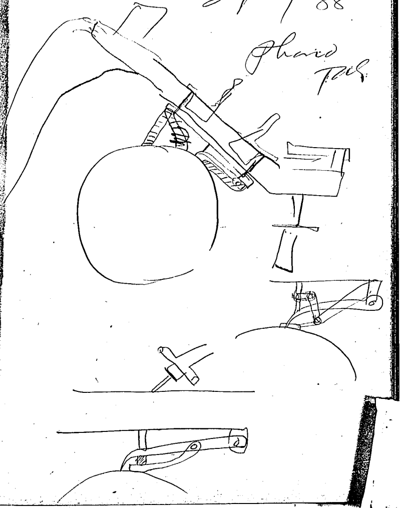
Sept 9 88

Phono

Tate







Sept 9 88

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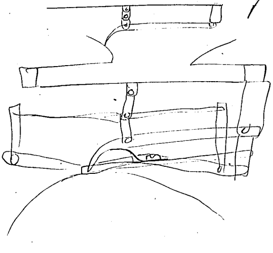
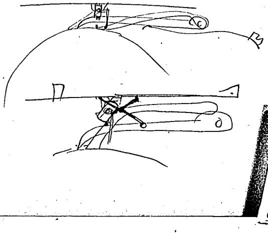
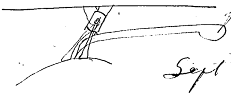
Sept 9 88

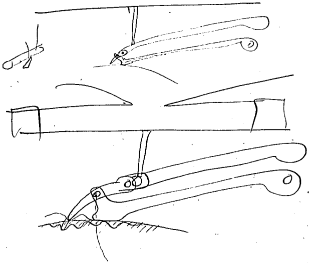
Phono Fac







Sept 9, '88



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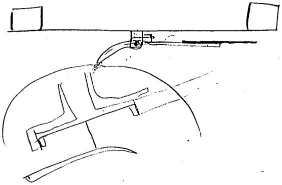
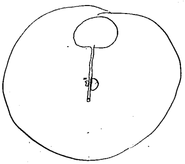
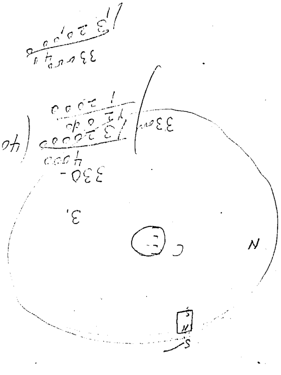
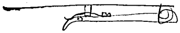
Sept 9 88

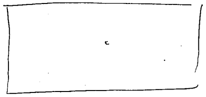


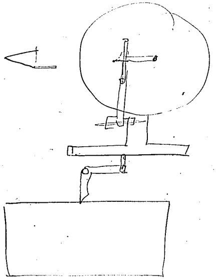


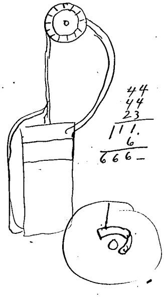




plans
Sept 9/88
Tue

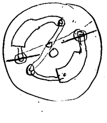


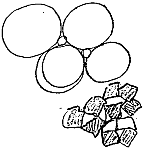


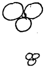


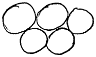
44
44
23
111.
6
666 –

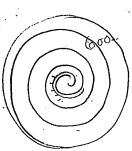
110. – 1 foot higher [illegible] –



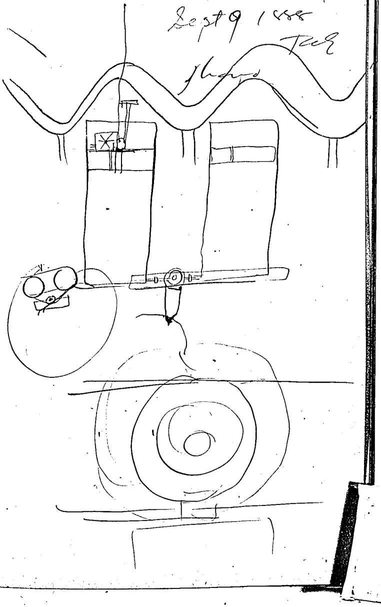






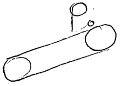


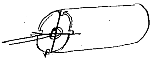
300 feet.	1 lb
	2
150	4
75	8
37.5	16
19	32
10	64
5	128.
2 $\frac{1}{2}$	

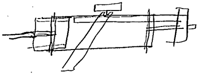


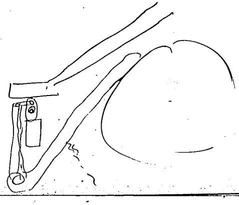
Sept 9 1888

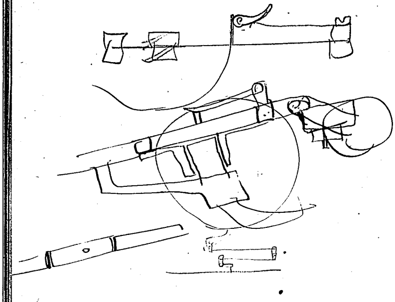
TAE









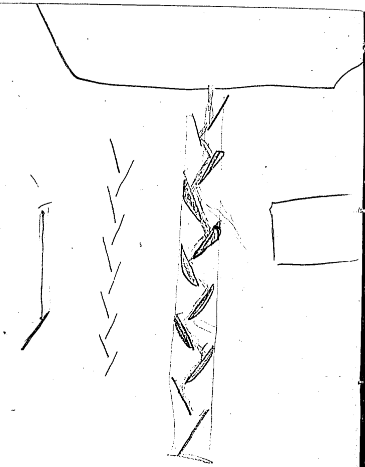


1.20 150 -
37
30
25
20
25
2.87
2.75
5.62

Battery Expts. May 18 1889

Chromate of Lead is insoluble
in Hyposulphite Soda —

alkaline Sol of Lead oxide
is precipitated by alkaline
Sols of Chromic stannic
Stannous antimonious &
Arsenious Oxides hence
Lead oxide say Litharge or
red Lead in Strong Soda
saturated with say Chromic
oxide should work with
Zinc, or a peroxide plate
with Zinc should work

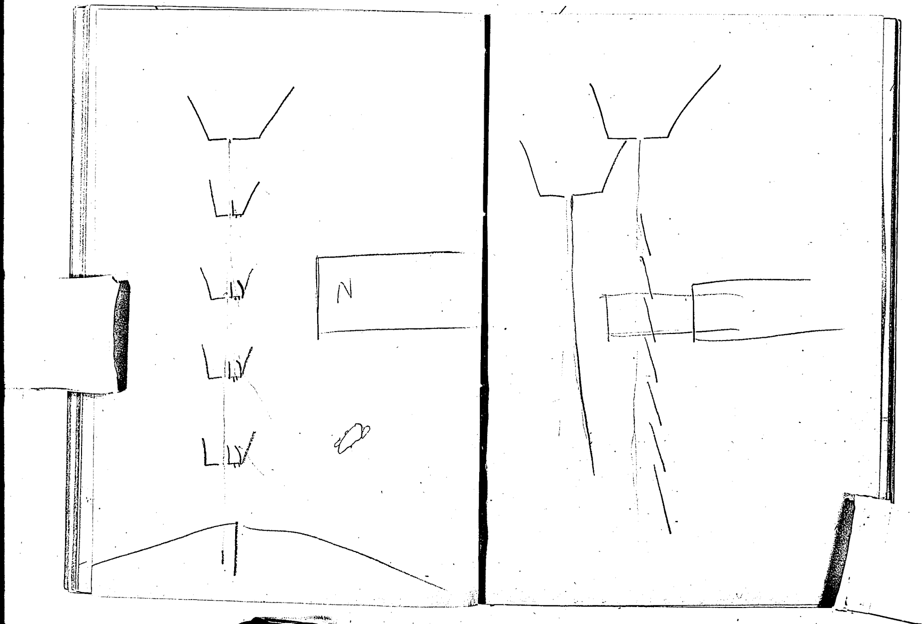


Oremly

Zinc Bromide combines with Bromide of ammonia to form a double salt which has a specific gravity of 2.628 S S — Quartz wouldnt float & gold would sink S S

oh dear the above is a Solid

Conc sol of double Chloride of Zinc & ammonium dissolves Zinc oxide perfectly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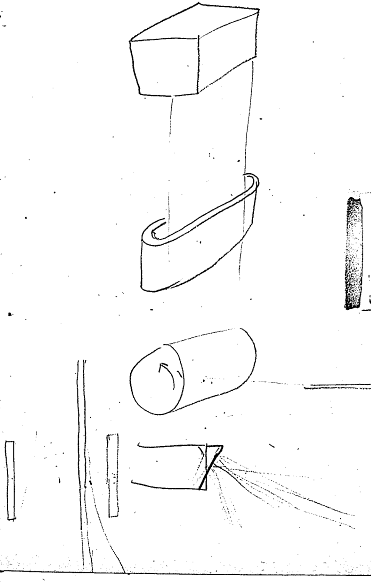
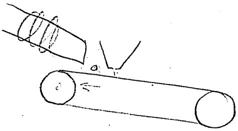
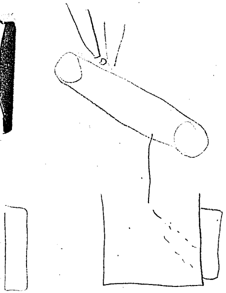
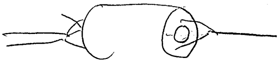
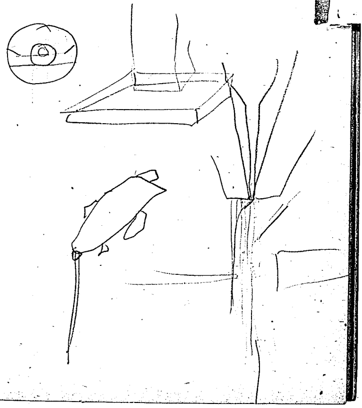










20
20
40 20
80

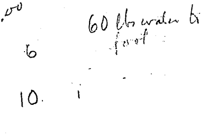
216

2160000
60
129,600000

60 hp -

21600
60
1,296,000

1.750,000



360 lbs water second
60
2160,0,00

60 lbs water to square foot

6

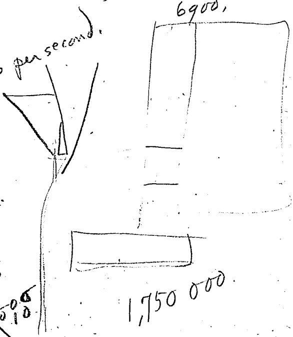
720.

10.

60) 414000 (6900
360
54

60.

115 lbs per second.

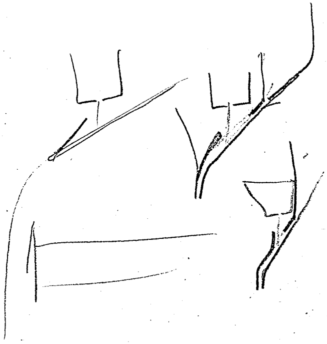


60
60
3600.

115
3600
69000
345
414000

1,750 000.

414000.



150

400) 10,000 (24.1
8000
2000
1600
400
4000
96

24 -

~~150~~ 312
260
18720
624
81120

24
20000
480000

2240) 30000 (13
2240
7600
6720
880

Niagara -

Triple Expansion Engines at 3 places in Buffalo - 20000 hp at 24 per hp including Condenser -	480 000
20000 hp boiler at 10 per hp	200.000
piping + setting boilers.	80.000.
3 Bldgs.	180.000.
40 double Dynamos	480.000.
Belts.	20.000.
Chimney Blowers Etc.	30 000
Station Applian	75 000
Outside mains for power	350 000
	1,895,000
Water Mains	75 000
	1,970 000

20 000 at 1½ lb Coal.
22) 30 000 per hour or 13 ton or 130 tons per day at $2. $260 day · 312 days $81.120 .

Coal –	81 120
payroll - Each station	25 540
3 station	76500 –
	7500
Ins 1,500,000	54000.
	6000
Genl Mgr	5000
President	9000
Supt & Tr	4000
Electn.	6000
oil	1000
waste.	800
800 pr branch	
Repair armatures Engines & boilers	8000
	280,420

15 –
7
25 | 52.
25
10

312
6
9 4
2

280 420. Eng
212 000 WP

Recepts at 9000 at 15
+ 9000 at 25

Recepts be 360 000.
deduct 280 0 00
180,000

6. 1800
5400
57
40/2300
2000
300
280
20

deducting interest at 6 pct on

1,970,000. 180 000
114,000
leaves 66000

for stock - or say 6 pct on a Million to say nothing of added Cost of Water power investment

Niagara alone Bldgs	600,000.
deliver 3 miles	30,000.
Cost conductors, poles etc.	15 000
	645,000,

4 Stations.

Running Expenses

Presdt.	5000	
Secy treas	3000	
Manager & Electn	6000	
10 hours run steady power	20000	wages
Oil & waste.	3000	
Brushes,	800	
Depn 3 pct includg renewals armatures on 650 000	19500	
Ins at .75	5000	
Repair on line.	2000	

24
20000
480000

64300
39000
103,300 Yearly running Expenses

Interest on 650 000 bonds

20000 Costing) 103 300 (5.16
100 000
3300 0
20 000
13 000

5.16 per year for Electrical part of Mills furnish their own motors if not. Then 480 000 must be added to investment making
645 000
480 000
1,125,000

6 pct on this is 67500
Expenses 64300
20000) 131800 (6.59
120000
11800 0
10000 0
18000 0

or 6,59 per hp —

:5

150 200000
3000000
31

22 500
500
1200

If sold for $8 per hp at 9, 10, 11, 12, 1

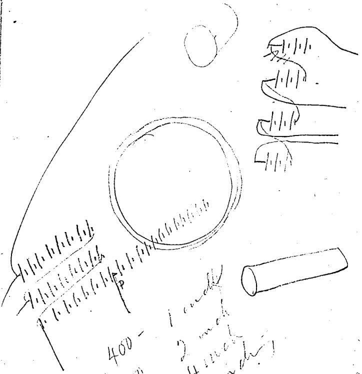
gives 160 000
Expenses 131 800
28,200
20 000
48
68
88
108

If the parties put in Triple Expansion Engines at ~~at 46~~ They can make their hp in 500 hp lots at following rates. 1½ lbs Coal 750 lbs hour or 7500 lbs per day ten hours. say 4 tons at 2.50 ton, 10 per day

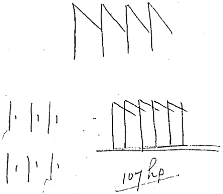
312 days
10

500) 3120 (6.2 per hp
3000
1200

for coal & 1500 for wages. 9.20 cents,

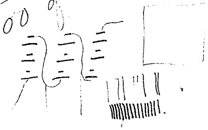


400 - 1 inch
100 - 2 inch
25 - 4 inch
6 - 8 inches



107 hp

$\frac{1}{200}$ of ohm



$\frac{1}{800}$	2
400	4
200 -	8

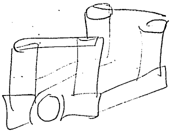
250
8
2000 -

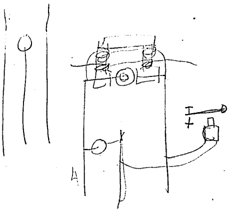
.01.

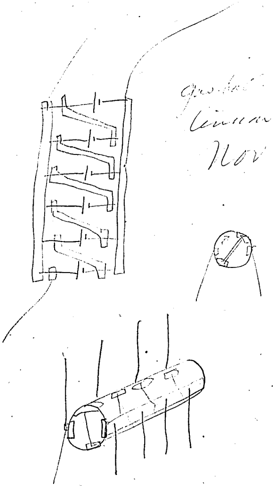
$\frac{1}{1000}$ ohm

7 · 250
7
1750

20
20
4.400
400
176 00 200
33000) 35 20 0000 (107
33 000
2 200 00
22

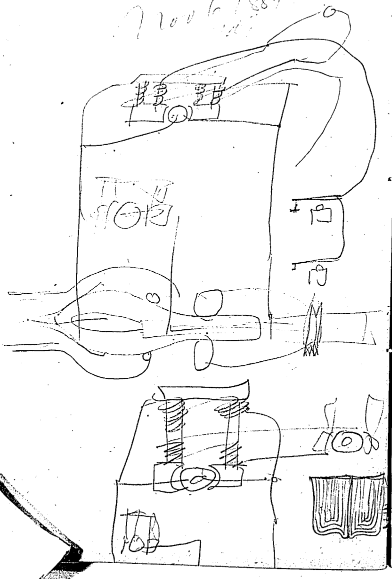




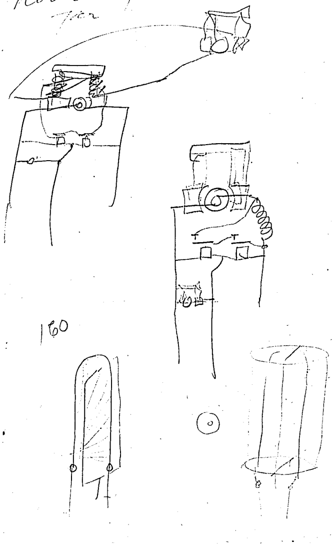


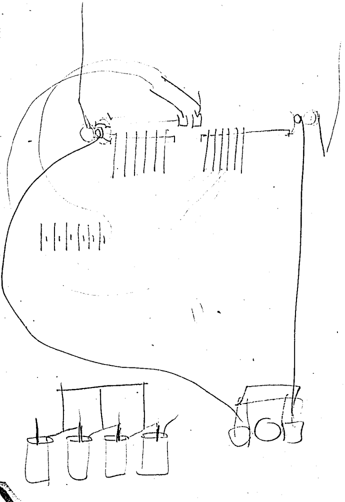
gradual
Current Reducer
Nov 6 1887

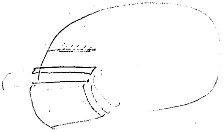
Nov 6 1889

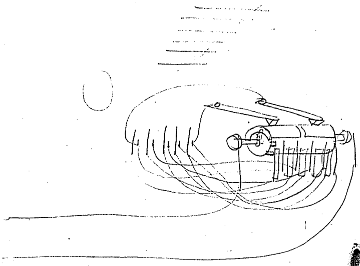


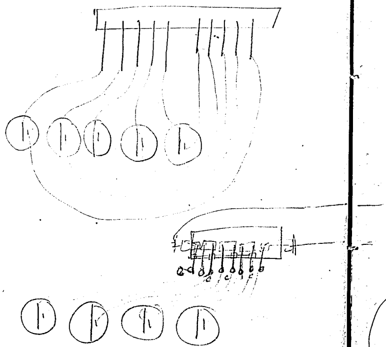
Nov 6 1889.
Ken

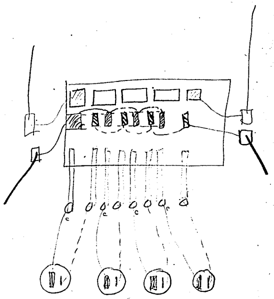


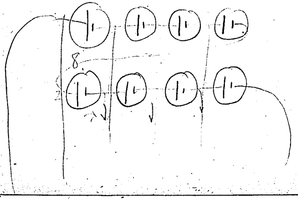








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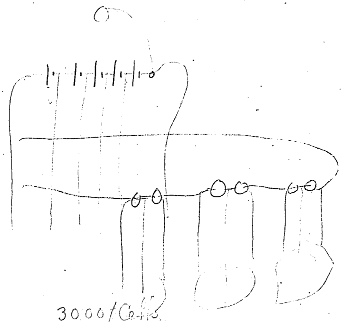
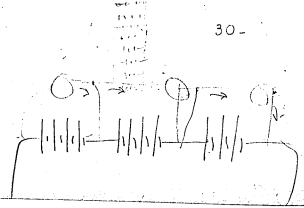


3000 Cells

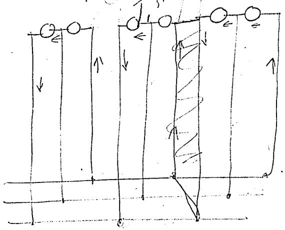
100 volts

30 -



36
30
25
91

17
91000
17000
158
1547000



52
7
364000
252000
616,000

800 -

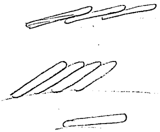
2

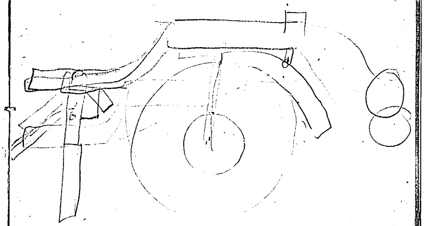
616000

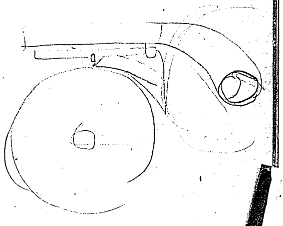
#7 hp -

36000
7
252000

1500000
1500000







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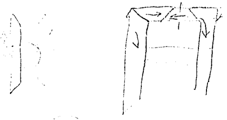

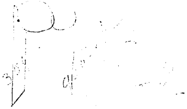

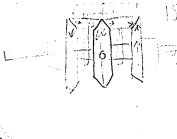

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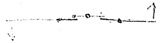

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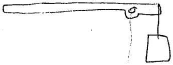

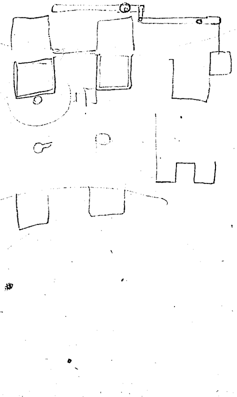

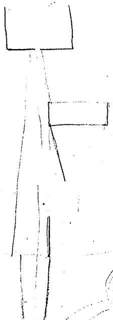

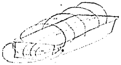

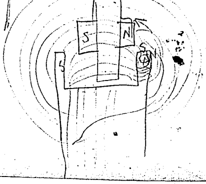

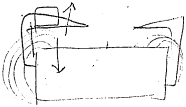

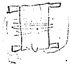

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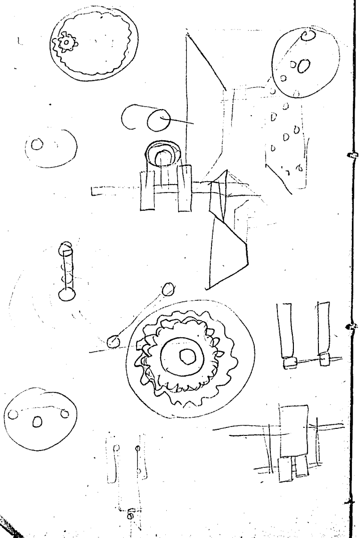

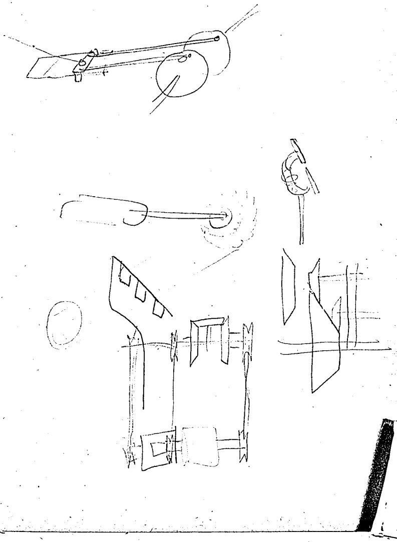

30
25
60 c — 50 mesh —
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Water — .3
Wear 3

55 c
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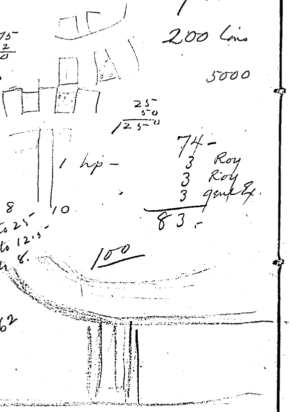

8 10

145 1 to 25
2.90. 1 to 12.5
72 1 to 8.
3.62 —

100

362

200 Ton Conc Drying 10 c
8
Magnet — 1.00.
Roasting — 50
Regrinding — 20
8
Buddling — 1.00
Matting
5

2000) 28800 (14.4
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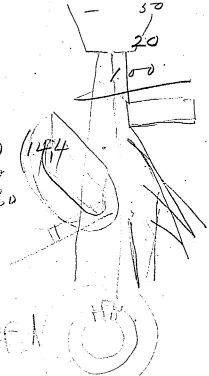
8000



2400000

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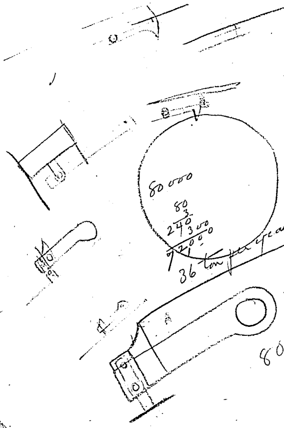
8000.

32000 —

52 feet year

20 yrs 1000 ft.



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3
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36 ton per year

10 —

20

80 —

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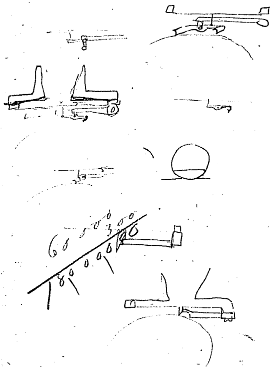
300
18000



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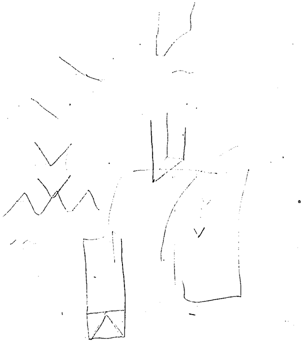

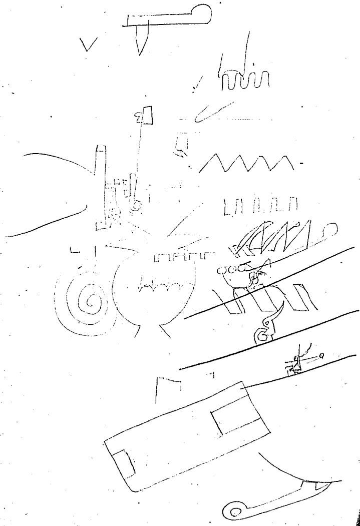

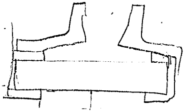

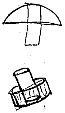

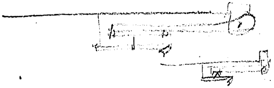

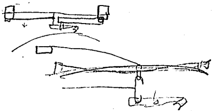

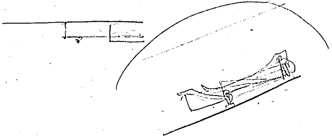

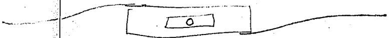

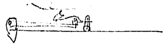

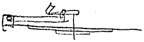

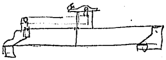

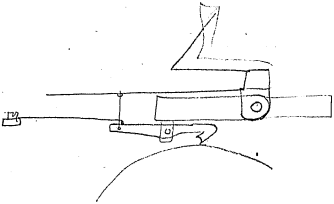

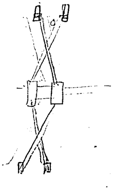
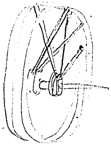
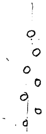
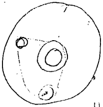
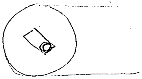
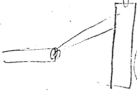

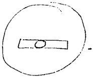

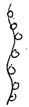

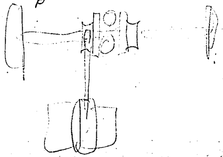

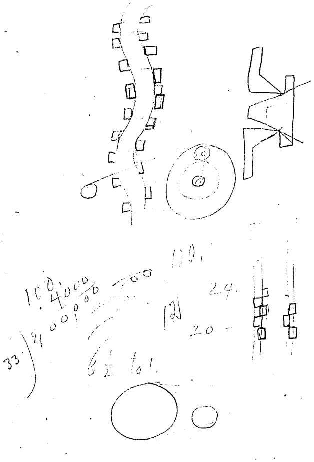

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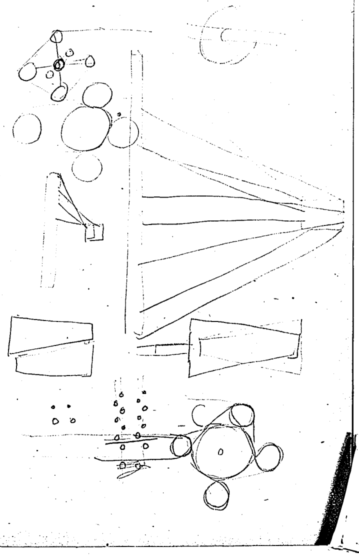

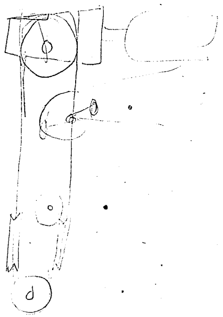

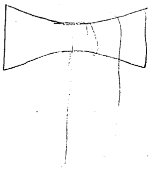

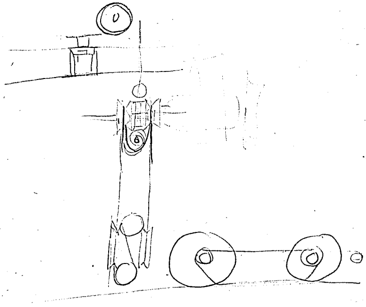

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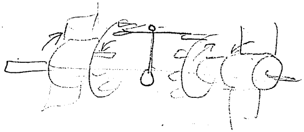

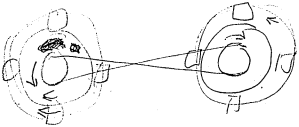

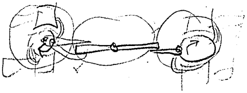

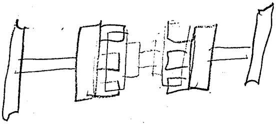

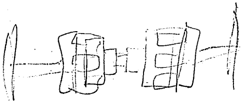

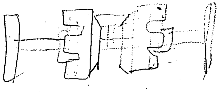

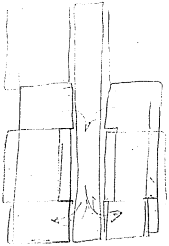

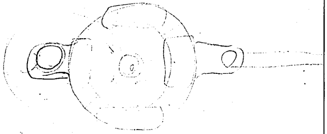

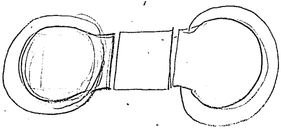

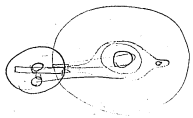

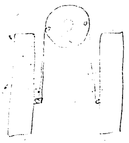

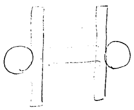

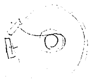

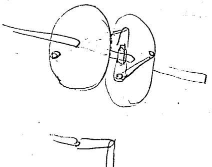

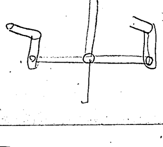

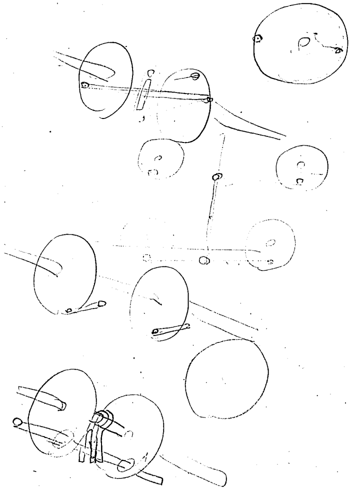

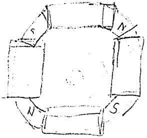
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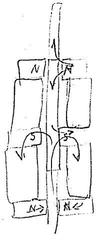
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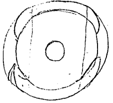

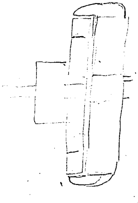

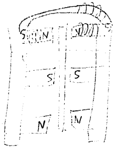
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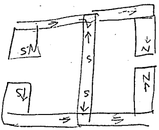
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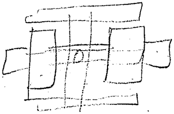
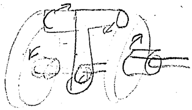
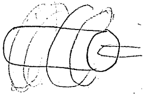
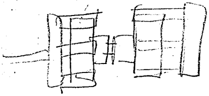
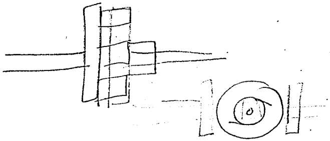
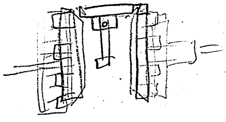


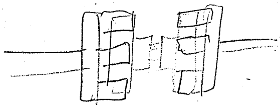


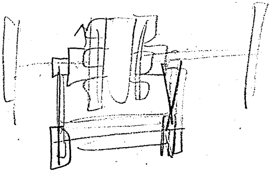


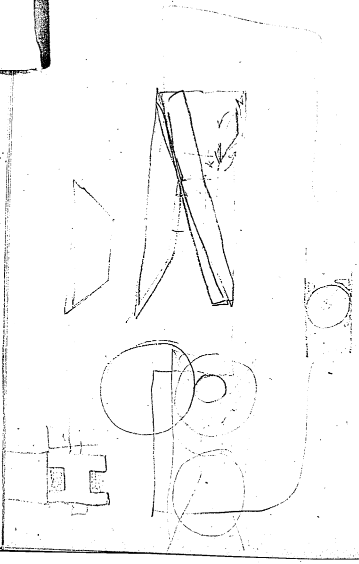


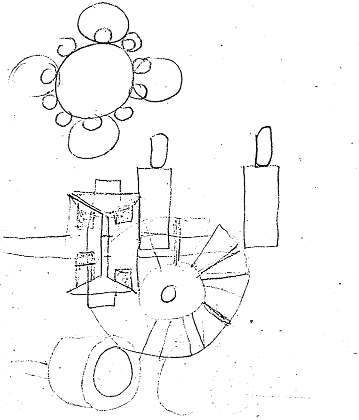


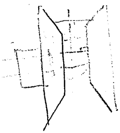


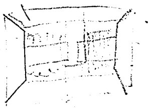


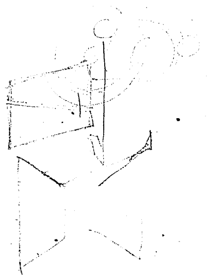


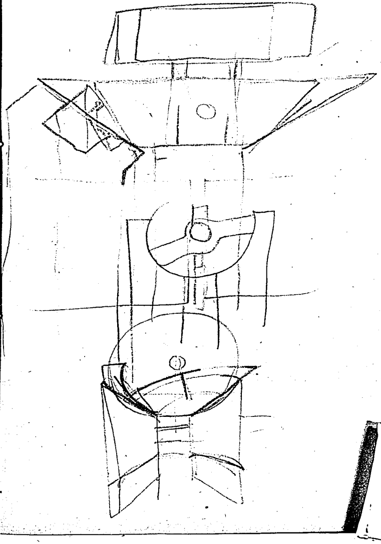










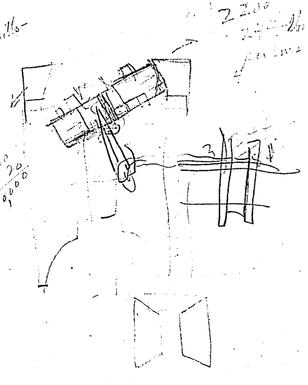


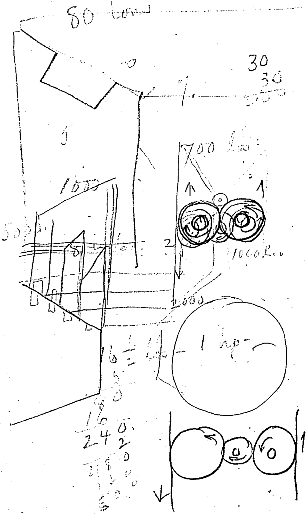
300000
30
9,000,000

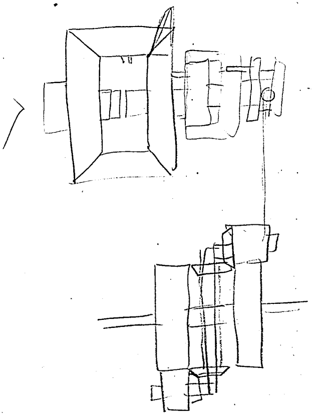
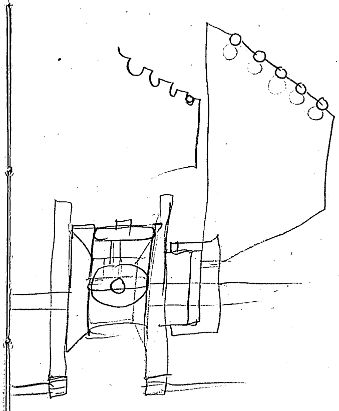
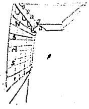
9 tons ... ton

5 mills -

600000
20
12,000,000






N
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A
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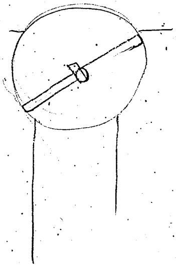
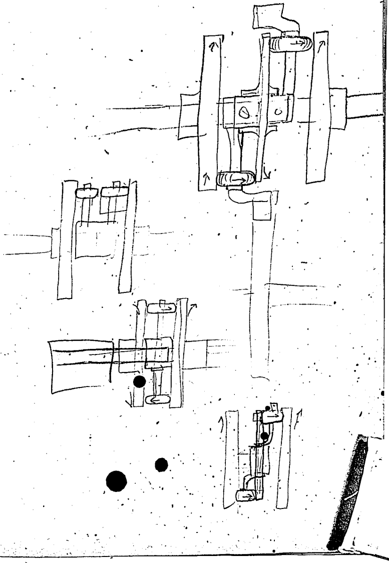
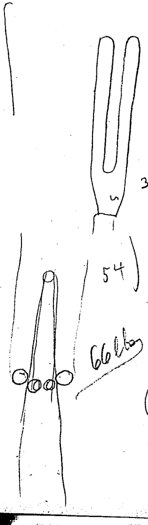






33 cc water | cc acid

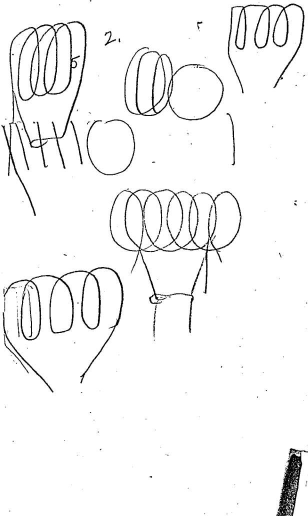
3 gram 100 cc sol.
3 gram acid -

54) 1776 (32.9 grams
162
156
108
480
1.8
30

66 lbs

54 grams

66.



2 tons Cubic yard 10 pct 780 ~~[illegible]~~

Mining. 7 tons. get 65 pct, or 3 ½ Cubic yds at. 75c	263.
Moving to Mill.	35
Crushing –	84
delivering Cars, the conc ~~[illegible]~~	5
Taking Care Tailing	14
Railroading Conc ~~[illegible]~~	25
~~Freight to~~ Furnace	110
Royalties,	45
General Expenses.	20
	501.
Brokerage	12
	513

Sold at. grant – 585
513
72 – profit

65
9
585

1000 ton Mill.

143 tons Conc. 72 c

145
130
429
143
1859
300
5550

Sold 690
513
137.

60 ~~[illegible]~~ 75c 100.

75
3
225
38
62 263

320

27
150
1350
270,
405
4320
437
448
890

2

15

(2

124
31
155

2240)

224

30.
60
175
235 000

4480
4370
110

155
27
1085
310
185
9224
4409
2240) 4480
4

(2

10.

7) 1000
143
7
1001

102
300
30,600,

143
72
286
1001
10296

60.
80
20
160 -
80.
300
160 -
140
32

5 75
375
30
60
1800
6
6.
40.
10
.3
15

5700
312
1400
1140
570
171400
1778
5) 17778 35563
31

---

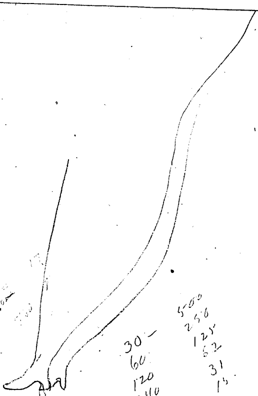
10 tons. 7 pictures

Mining	375	250
	30	
moving to mill	120	
	5	
Delivering Ore to car	20	
Ore Tailings	25	
RR	110	
Frt Fun	45	
Royalty	20	
Genl Ex Brokerage	12	
	782	
	125	
	657	
	67	
	590 -	

10

375
50
5
40
7
25
110
45
20
12
689

300



17

20) 7600 (380

15

1000

10000

30 —
60
120
240
480
960

500
250
125
62
31
15

Electric Welded Rails -

System with simple Motors running Dynamos -

Double Trackage -

A general System with Central station several roads -

wire brush take off Current.

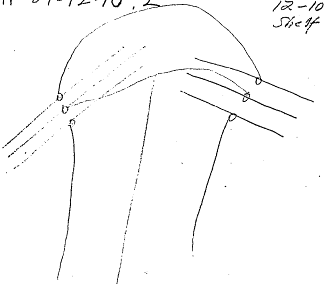
Clean Vaults which not Effect horses

Notebook, N-87-12-10.2

This notebook covers the period December 1887-November 1888. All entries are by Edison. Included are several notes to John Ott, written about December 12, 1887, in regard to proposed experiments on a pyromagnetic generator, arc lights, telephones, batteries, carbonization, and the use of a thermostatic meter strip as a meter, as well as experiments to "ascertain if there is any substance which stands the lines of magnetic force." There are also some drawings of the phonograph dating from September and November 1888. The remaining entries are undated and consist of notes on experiments to determine whether iron "is a non conductor of electric stress." Some of these notes also contain Edison's speculations about the electromagnetic properties of the ether. The pages are unnumbered. Approximately 120 pages have been used.

N-87-12-10.2

12-109
Shelf 2

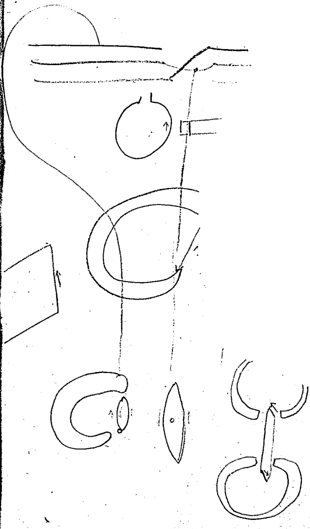


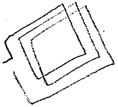
173)72.00 .41
692
280
173
107
173

173)72.0

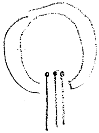
108)72.00 .66 2/3
648
720
648

$\frac{72}{108} = \frac{36}{54} = \frac{18}{27} = \frac{6}{9} = \frac{2}{3}$





.6



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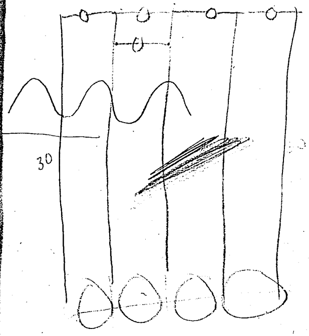
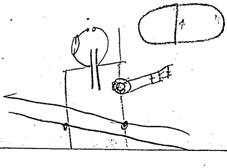
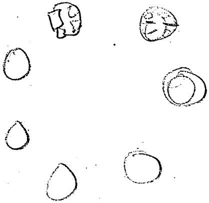
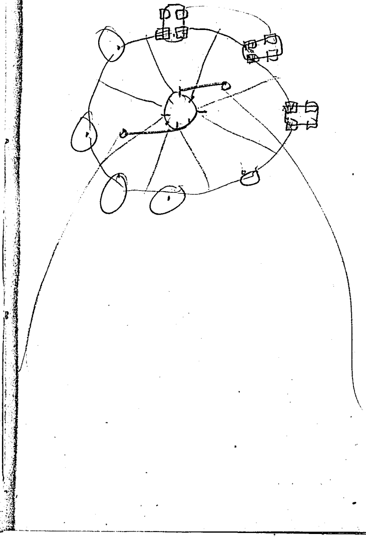
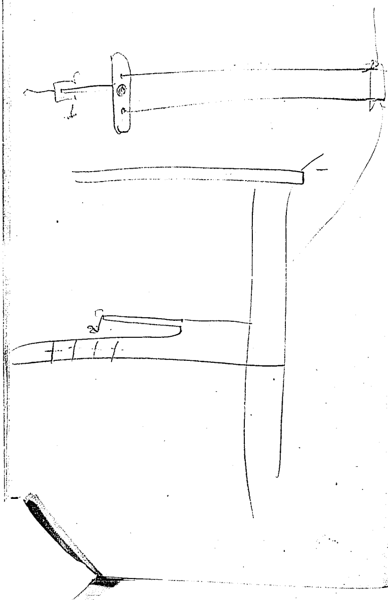






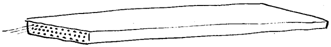




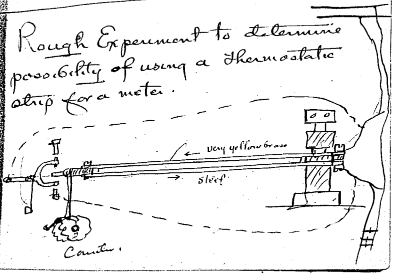
Orange NJ Dec 10/87

John -

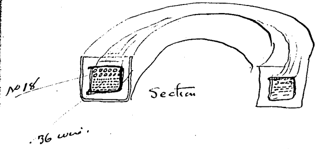
- When the hydraulic press is set up mould some forms with say 15/1000 Copper wire in middle, we can eat this out by acid, Hydrochloric & this will leave a straight holes & the form can be carbonized -

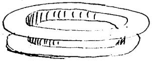


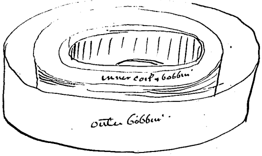
Rough Experiment to determine possibility of using a Thermostatic strip for a meter.

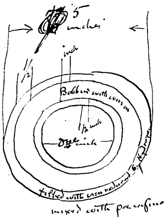


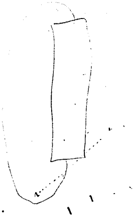
Make a Telephone induction coil thus

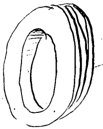




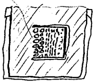






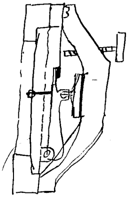


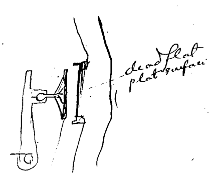
bobbin with wire on
This sets in another
bobbin so there is 1/2 inch
of powdered iron mixed with
paraffine all round it.



End View of whole coil
Cut in Two

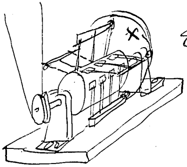
Make a telephone Transmitter.





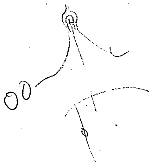
platinum surface dead flat,

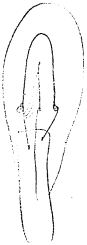
Ferrotype plate free at Edges — Edges of brass where diaphragm touches heavy ~~shellac~~ Coated with Rubber varnish diaphragm very flat so it touches all around Edges — I propose to use disk of lamp black same diameter as old button but only 5/1000 thick — Everything perfectly rigid like phonograph Recorder



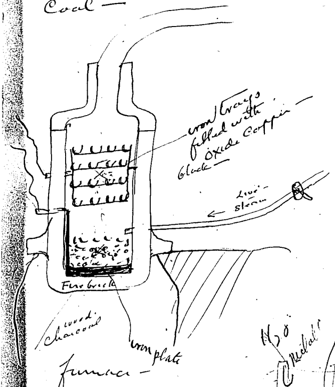
Electrificating Battery

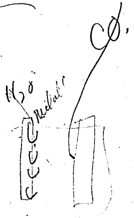
a cylinder of a brass tube ~~with~~ perfectly true & highly polished - diameter cylinder 3 inches. 3½ long - run very rapidly by a belt. There are 4 sets of 3 each springs secured to metal rod that all connect together on a rubber or metallic disk X which is insulated from the revolving cylinder base - all the rubbing springs are connected together while the cylinder forms the other pole - on the ends of these rubbing springs are soft leather pads pressing about 1 square much of surface, The surface of the Leather is covered with pure tin foil. which makes electrical contact with the springs— The rubbers should be arranged to be easily disconnected as I desire to cover the leather with many kinds of metallic foil— The pads should press only just hard Enough on the cylinder to insure contact & as much surface as possible— When Instrument all ready shellac the cylinder with a very thin coating of shellac less than 1/4 of a thousand thick, perhaps this can best be done evenly by dipping it in Solution then heat it so as to harden shellac, Then I will be ready to try some Experiments with it =



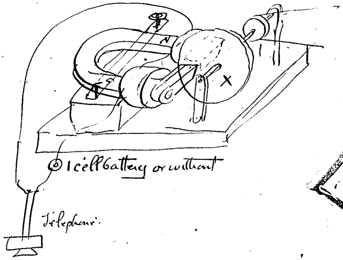


Experiment for obtaining ~~Heat~~ Electricity direct from Carbon or Coal —



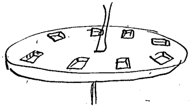


Experimental apparatus to ascertain if there is any substance which retards the lines of magnetic force.

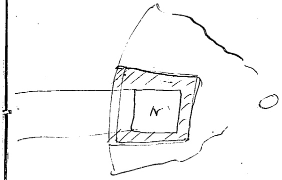


X is a disk of hard rubber 6 inches in dia - $\frac{1}{4}$ thick - Or caouchouc

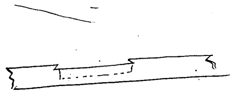
There are recesses in or near the Edge



These square places are about $\frac{1}{8}$ deep + about inch square

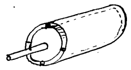


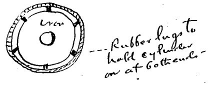
I fill these places which do not go clear through with various substances They have a sliding cover so that when they are full I slide the cover on thus



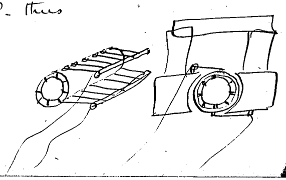
by rapidly rotating the disk and the several chambers being filled with different material if any the substance retards or obstructs the lines of force, it will send several waves into the Coils around the magnet & be heard in the telephone - I want the chambers to pass at such a speed that 300 will pass in a second but 100 would answer probably -

Take a No 1 Dynamo 20 ampere, use the armature without any wire, over this but insulated by an air space put a hard rubber Cylinder polished on the outer surface,





arrange about 20 springs with leather pads on end covered with foil - thus

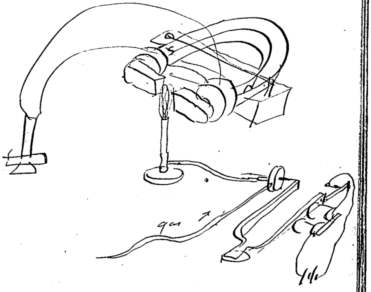


I want to carbonize about 25 or 30 materials at once so I can test the Carbonizing properties of several hundred substances at once

make 6 Carbon plates from battery Carbon 6 X 6 1/2 to 3/4 thick - sink holes in it 1/2 inch diameter & to such a depth as will leave 1/8 stock at bottom, put these holes at such a distance apart as will leave a wall of 1/2 inch between the adjacent hole

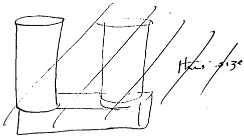
By filling these holes with different substance & placing one form on top of the other I can Carbonize a lot of things & then study the Carbon produced & the amount —

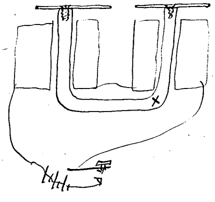
Set up in Galvanometer Room on floor stone pier - The magnetic pendulum Tripod & appliances



Vibrate flame in magnetic field see if get sound in telephone =

Make



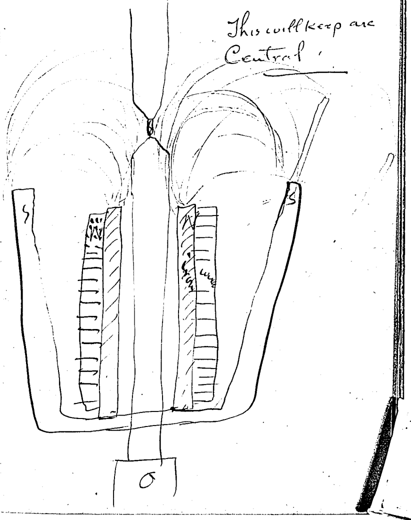


Cores X with
disks that can be
screwed on of all
the following metals

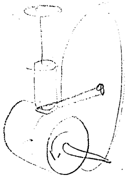
Lead—Tin—Antimony—Bismuth,
Copper—Zinc—Cadmium—Brass,
platinum—Cerium—Silver.
Carbon—

I want to coat the surface of the disks with various
material

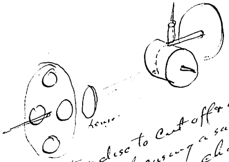
arc light Experiment.



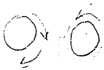
This will keep arc Central.



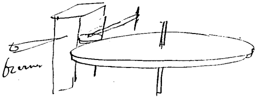
Devise apparatus —

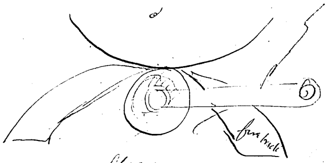


Rotating disc to cut off & on the light, focusing a sun beam on rotating chalk cylinder should effect the capillarity & be heard in telephone.



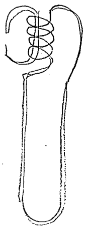
Design a good apparatus for thermo Experiments same as we had down to Florida—

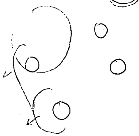




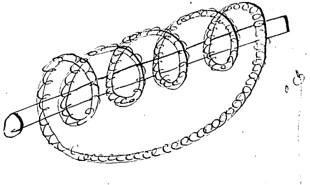
.35.

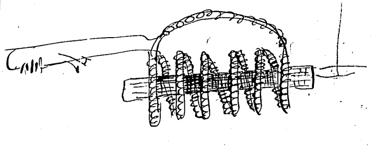
Make large disks of following also small disks— Cast iron—wrought iron— Copper Lead Zinc Tin, German silver (Silver small) Cadmium—Bismuth—antimony—Brass yellow—Brass Red—pure nickel—Cobalt, Platinized nickel.
Talk to me about this before doing anything



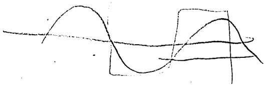


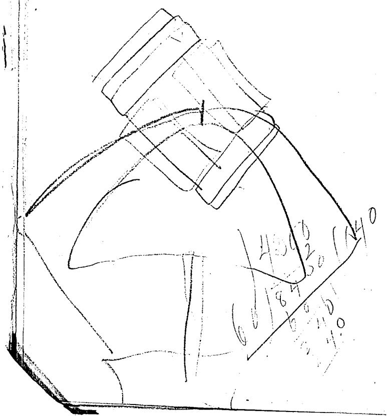
Experimental Apparatus





About 10 feet of soft $\frac{1}{8}$ iron wire wound with No 22 or 23 silk covered Copper wire - be sure it dont make contact with iron - leave 1/2 inch hole in Center to put various metals.

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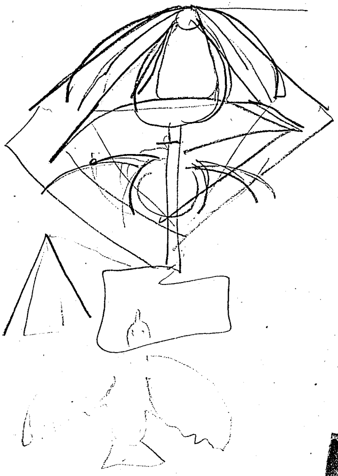
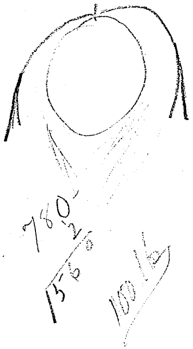
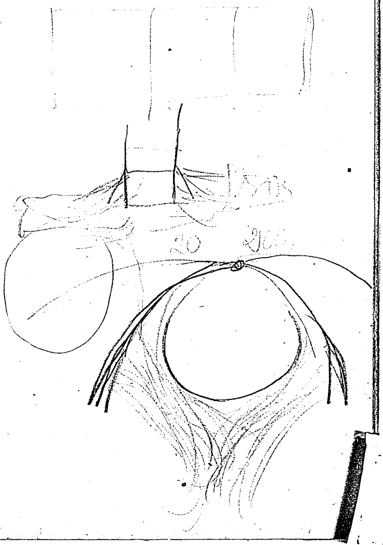
40



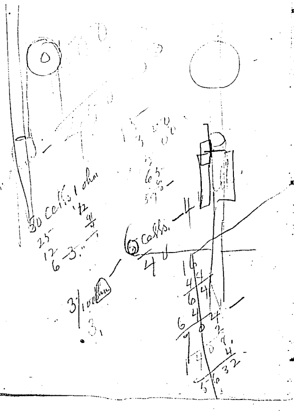

780
2/6
15-6
100 lb

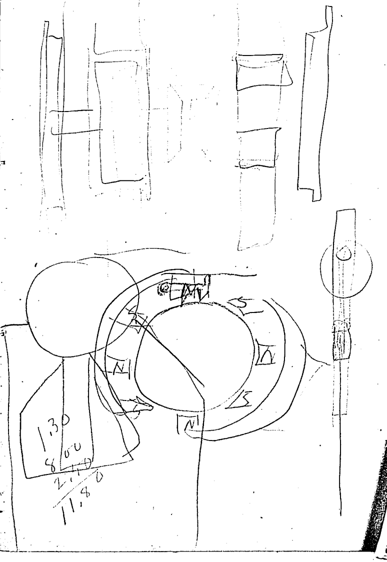

20
200

6 cells sq ft .. $\frac{1}{6}$ hp –

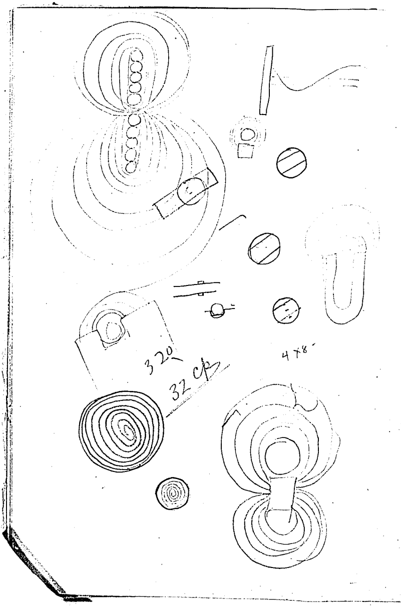
36 sq ft 1 hp –

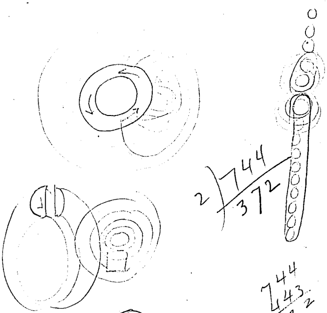
36
20
720



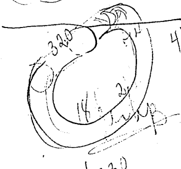


1.30
8.00
2.10
11.80





2) 744
372



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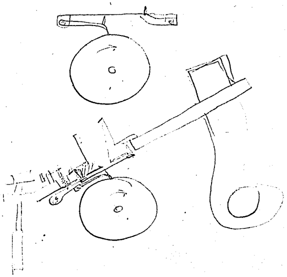
Phonogh Sept 1 1888



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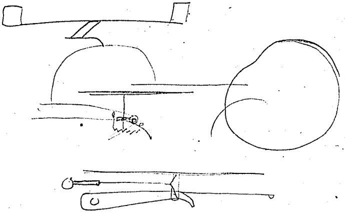

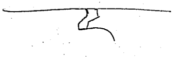

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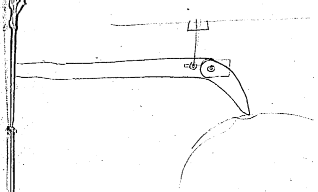

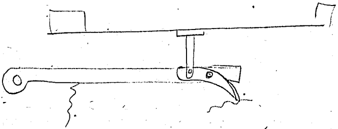

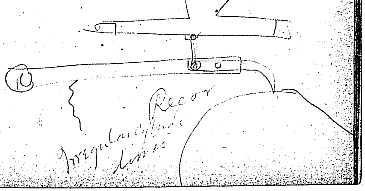

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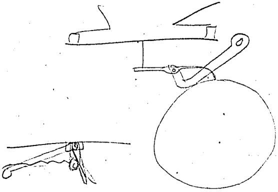

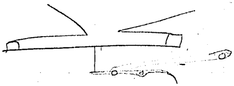

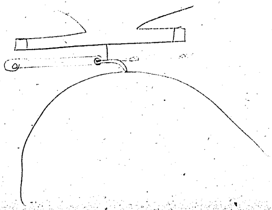

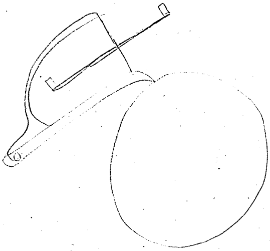

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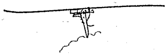

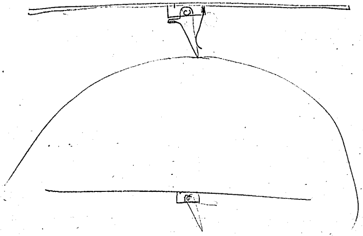

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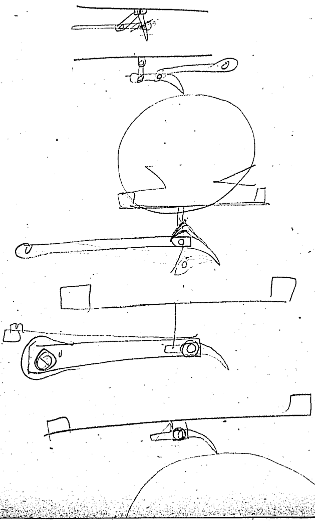

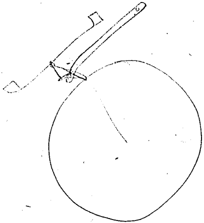

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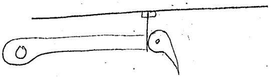

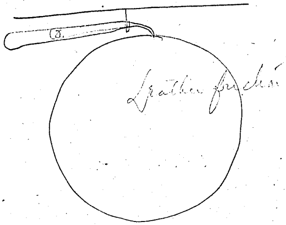

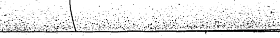

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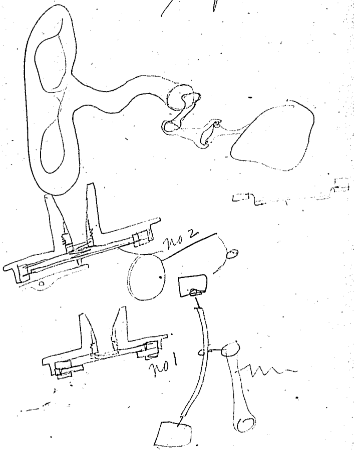

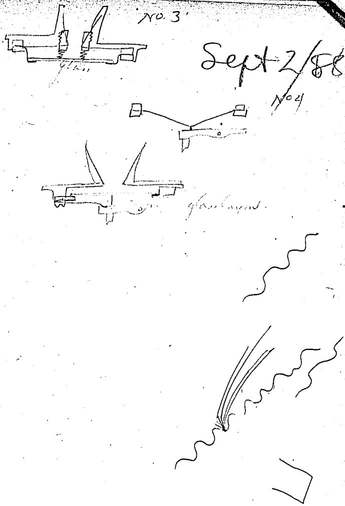

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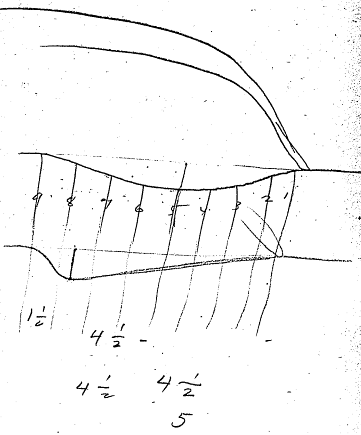

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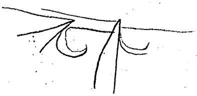
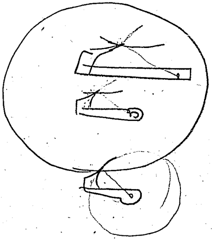
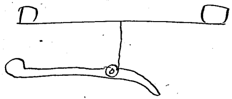
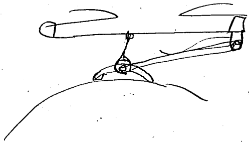




Sept 11 88 phono





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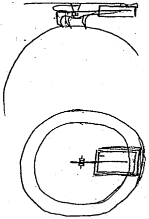

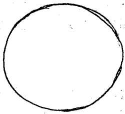

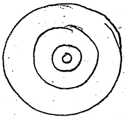

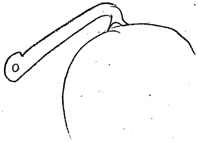

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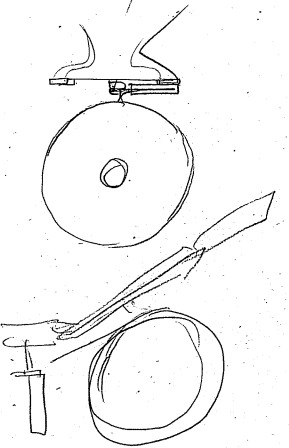
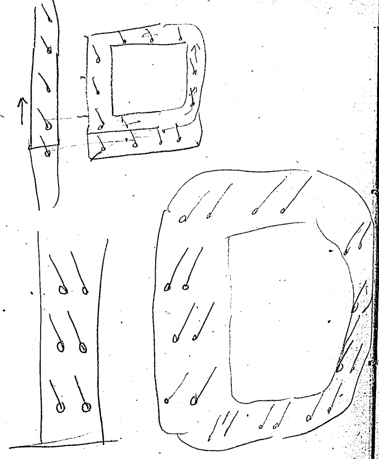
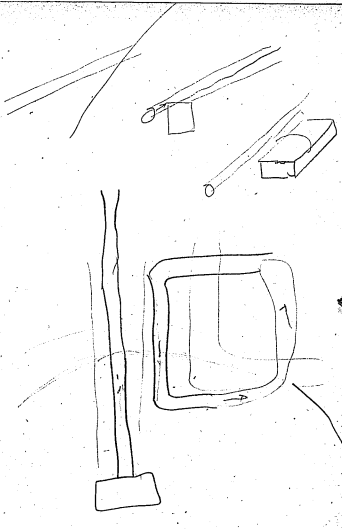
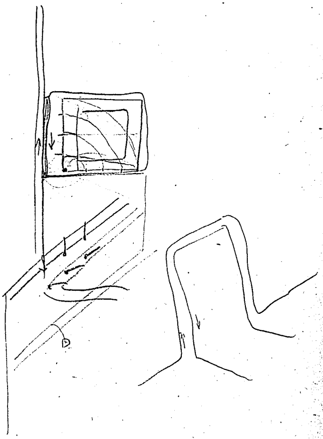
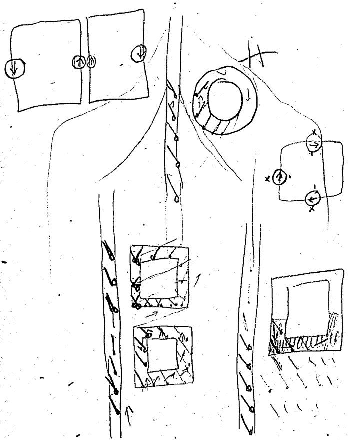


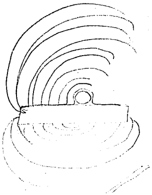


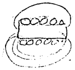


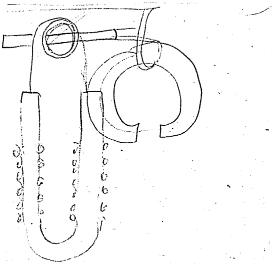


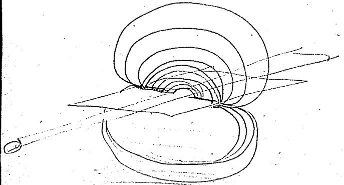


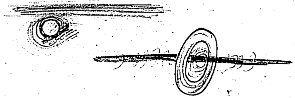
Iron Insulator of Cu E Stress

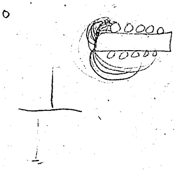












Iron is a non conductor of Electric stress

In favor –

1 Permanent magnets need only be hardened on the surface –

2 Permanent Mags are more powerful the more you laminate them,

3 As Electric stress will take the ~~shortest~~ path of least resistance the stronger magnetism of the Edges is accounted for in a straight magnet,

4 = If a piece of straight iron only deforms the Circular stress in a wire – then the above theory is wrong but if a new system is impressed it is only apparent & not real and the theory is Correct.

5 If ~~[illegible]~~ an insulator to stress then the Surface is the seat of activity then loss of stress will on concentration follow a curve similar to the scale of radiation of Energy in a filament when raised higher ~~and~~ higher

6 If an insulator & stress a surface action skin deep. The focault Currents heat ~~so~~ mainly takes place on the surface of a solid magnet any internal heat is due to Conduction,

7 ~~If an insulator a small wire of iron~~
~~acting as a magnet should Expand &~~
~~contract any more than a large one.~~
~~[illegible]~~
~~(10) Expansion~~ & contraction due to magnetism
Expansion could take place in the skin

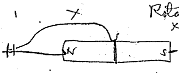
8 The iron displaces the Ether & produce a concentration of the amount displaced on its surface, (10) there is an ether pressure on its surface the same as if it was made to displace water, there would be a water pressure on it if suspended in the ocean, Other matter does not displace Ether, work must be done by the Current to displace this Ether when normal ~~the~~ no more Current will produce any further Effect, the iron accordg to regular theory would be called saturated,

All matter displaces Ether to some extent, Bismuth the Least,

Light should be effected if Ether is Cond'd on the surface of magnet,

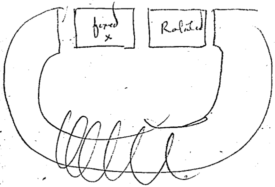
Gordon Kerr Expmt closed Mag Ckt good —

Conversely powerful beam light falling on a portion of a closed ring magnetized should give an induced Current

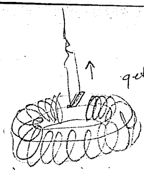


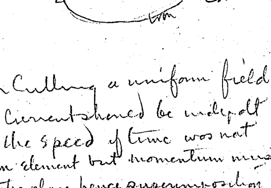
Rotate Mag gives Curnt x standing still. Lines rotate with magnet.

will any ~~twist~~ of lines take place in this gas suppose X very thin plate,



If iron displaces the ether entirely and Copper very little how are we to account for Electric Conductivity of Copper being greater than iron perhaps Copper condenses the Ether and make ~~a bow~~ the surface below normal this is borne out but there being no work done or self induction in ~~straight~~ wire again. the Wave or other motion Coming over is an independent action from the Ether the latter being only a state





Note
~~Iron Core Cutter~~
Para Core Dia
Cutter — Conversely
Dia Core Para
Condr —

In Cutting a uniform field the Current should be indep't of the speed if time was not an element but momentum must take place hence superimposition & rise of Current in proportion to speed

Two theories must be had

1st Iron condenses the Ether internally & reduces the Ether below normal Externally

2nd Copper-Bismuth Etc - displaces the Ether and concentrates it above normal Externally – hence only the surface of the Copper acts the medium ~~[illegible]~~ stress being absent internally –

or
3 } Vice Versa in both Cases,
4 } —

Hence m.l. stress flows over the wire to the below normal until at normal when the magnet & the whole system is at normal or as it is said Saturated,

~~In a battery~~.

work done in displacing Ether this disturbance must be propogated through Ether the atoms in heat must be given off in proportion to the work done in setting Ether in Motion

If work is done by combn of O with Zinc. the Ether of the Molecule is displaced in Combination as the resultant Compound has less Ether than before

This excess must be propogated along matter which ~~Ether~~ has less or more Ether than space or condenses ether leaving on its boundary surfaces less than normal

Ether -

with a wire the medium surrounding or within the wire must be rotated if Longitudinal motion only or Longitudl vortex it would not give directive force to magnets.

any disturbance of the ether ~~[illegible]~~ ~~output~~ has a fixed speed which is say the Velocity of Light. Every phenomenon of dynamic Energy which uses Ether as a medium for propogation must necessarily have the same speed, Heat Light Elec Mag all must travel at same speed, but this dont imply they are same thing Light is not a magnetic.

phenomenon simply because Magnetism travels at same rate.

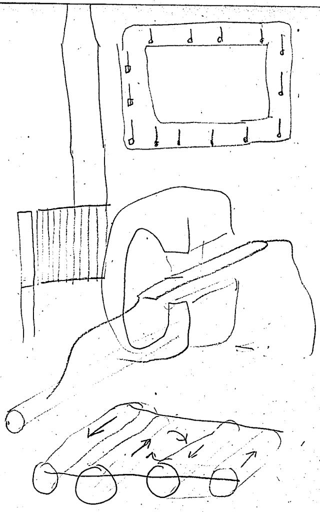
If Kerr Effect is simply due to particles of iron strongly magnetized at surface, as per Regular Theory + side Effect why shouldn't one get in on a mag weighing 1 oz saturated. Its because the Ether Condensed on a surface is at the square of the size of the iron Cylinder -

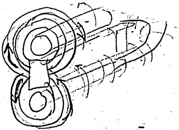
It may possibly be that Iron Condenses the Ether + Cu displaces it, as this essential for Explaining attraction + repulsion of Cu wires with Current to suppose Ether outside

Magnetism - phenomenon on a wire etc is not Energy Conduction in a wire is independent of those phenomena, which are merely a incident or resultant for instance when a current is passing through Copper the lines around the wire ~~are~~ ~~for~~ or a piece of iron in proximity are fixed. there are no Vortices moving But all is static. The Energy is transmitted by billiard ball action

The stress is constant,
The circules around a
wire are not real but
are made Evident by iron
filings - The reason they
appear a circles is that:
The stress is propogated
in ~~[illegible]~~ or on the
surface of iron at right
angles to that in the wire.
This stress always takes
the shortest route or
path of least resistance
The path of least res in iron
is at right angles - the reason
why iron requires so much
Energy to stress it is because
it ~~[illegible]~~ has Ether more
condensed or rigid +

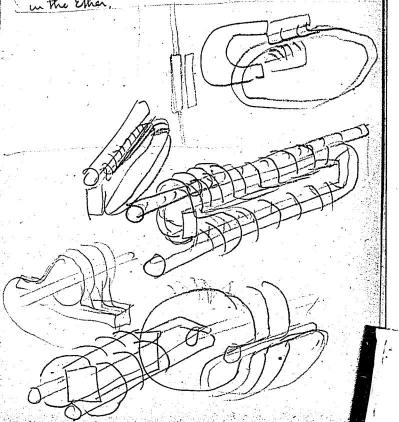
requires more energy to produce a
rise + fall of the stress

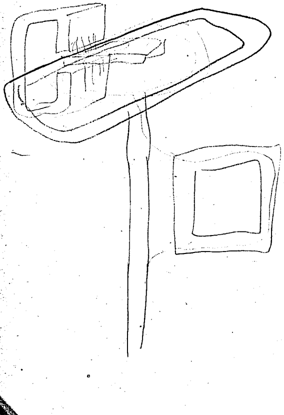


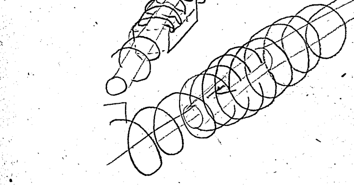


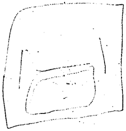
~~Each atom when free is ~~in~~ an Envelope of Ether, on combination that gives heat, There is a dimunution of the Ether~~

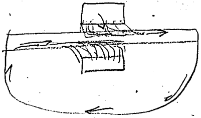
Two atoms combine & produce a rarefication in the Ether,

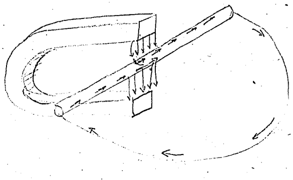


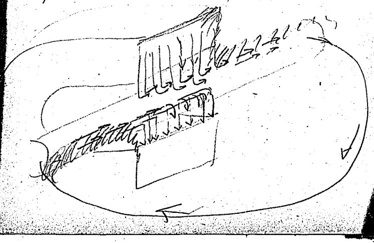


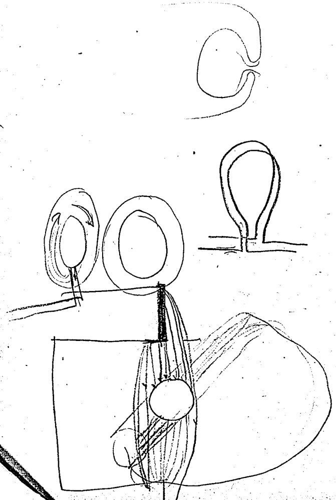


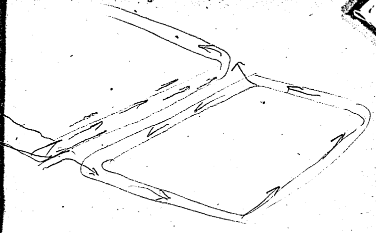


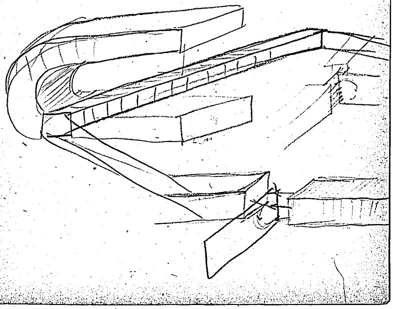




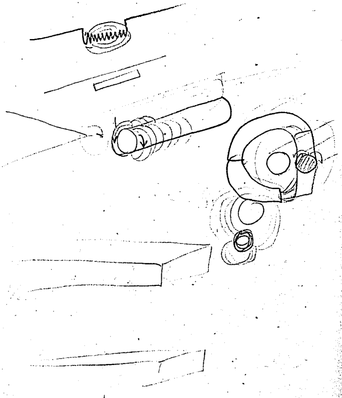


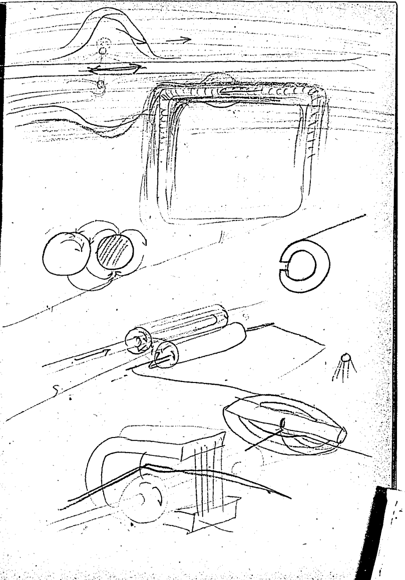


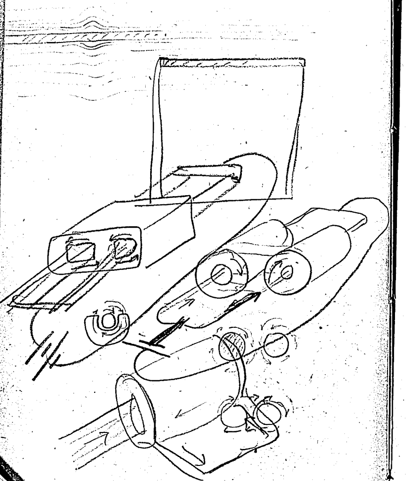


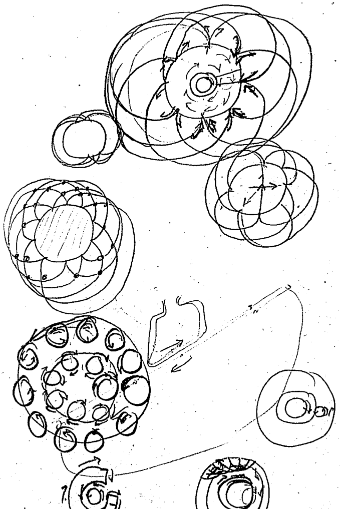


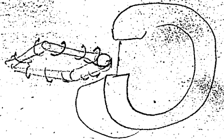
1 am 1 ohm
$\frac{1}{10}$ amp. 4 ft.lbs — 10



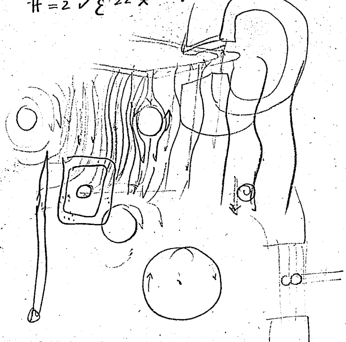


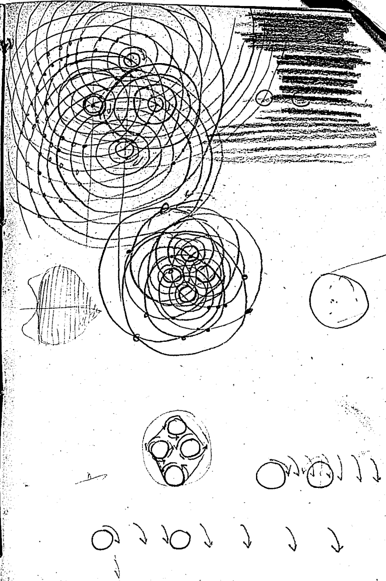


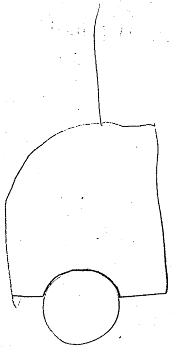


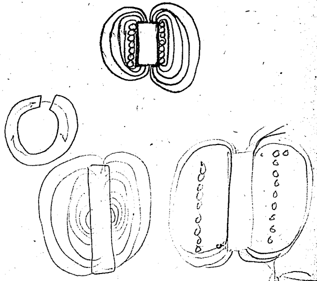


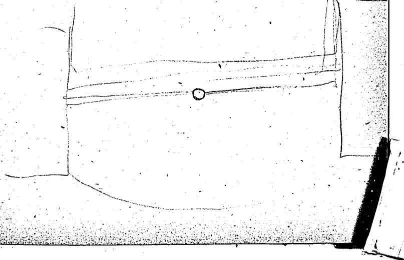
$H = 2\sqrt{\varepsilon^{22} \times \omega}$

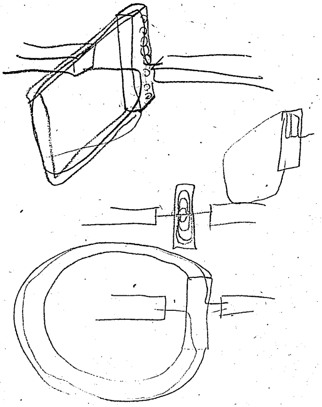


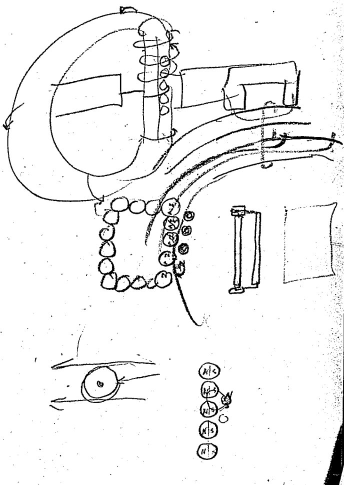


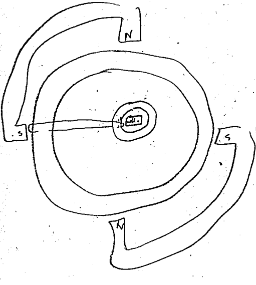


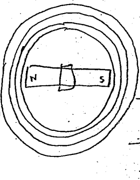


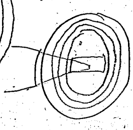


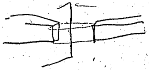


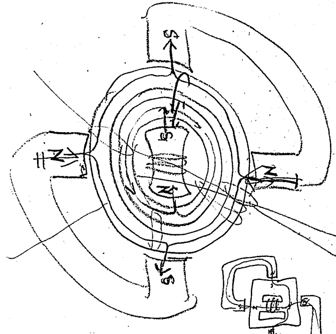


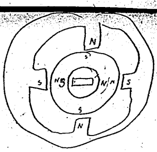


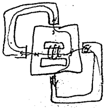


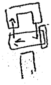


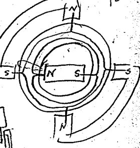












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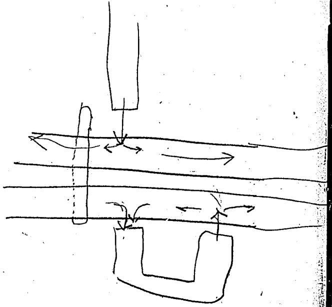

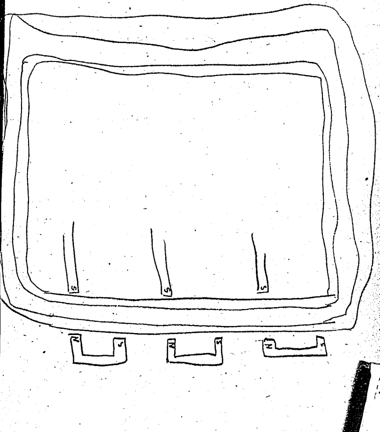
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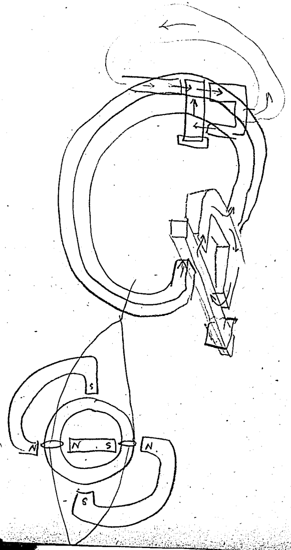
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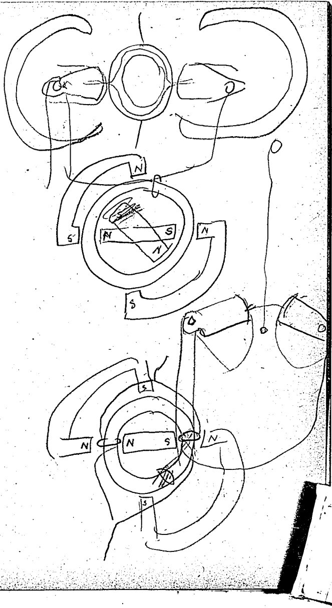
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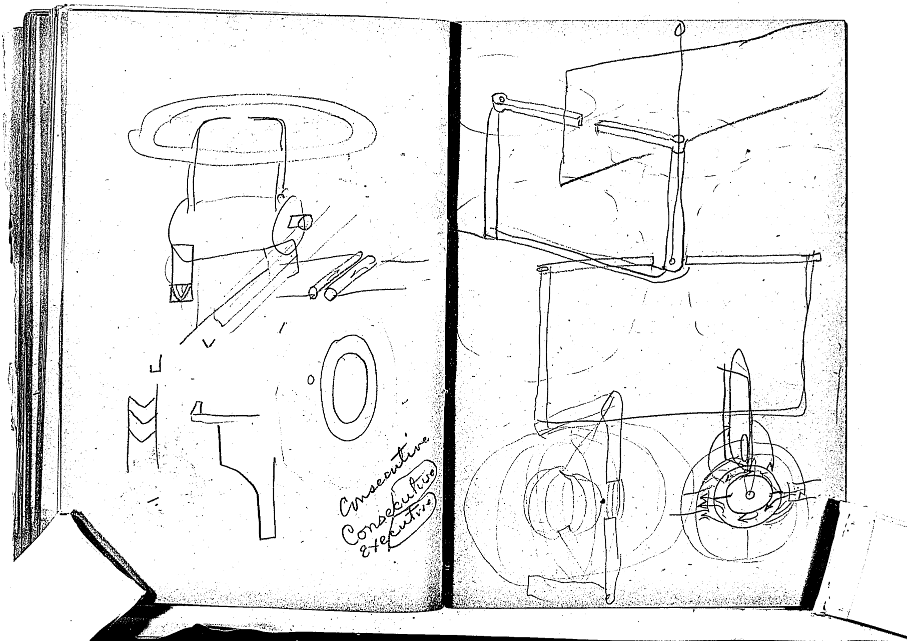
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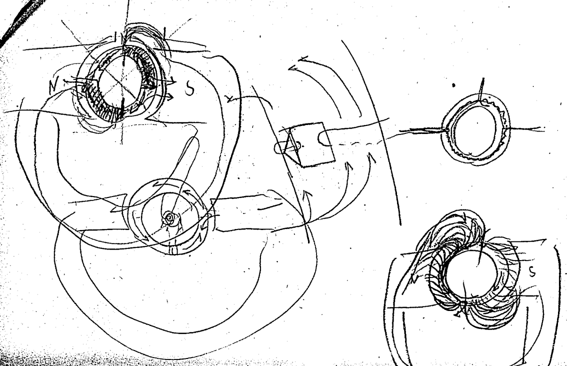
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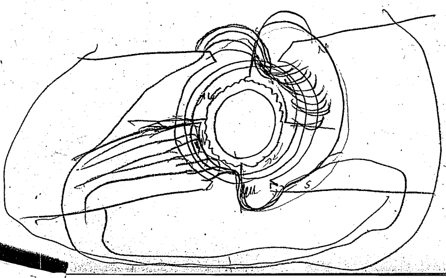
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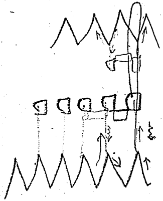

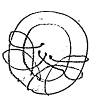

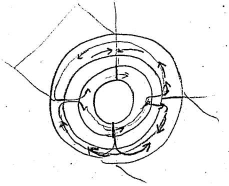

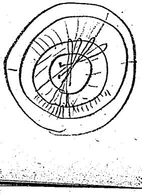

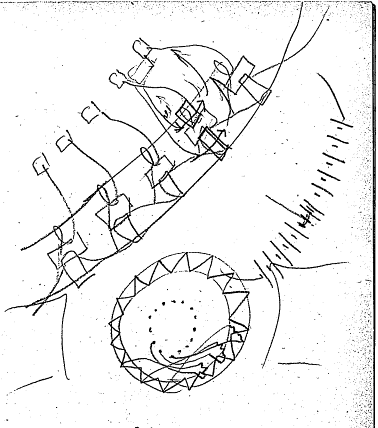

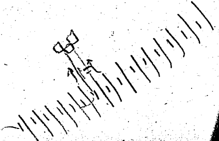

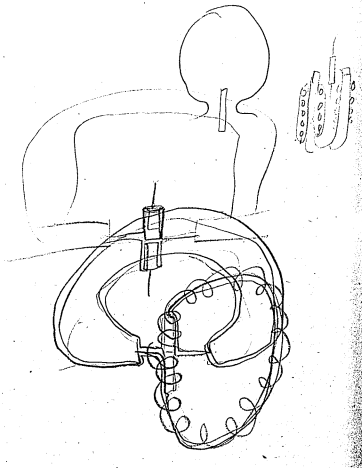

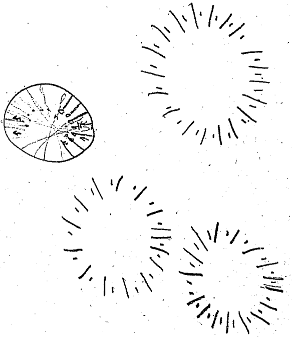

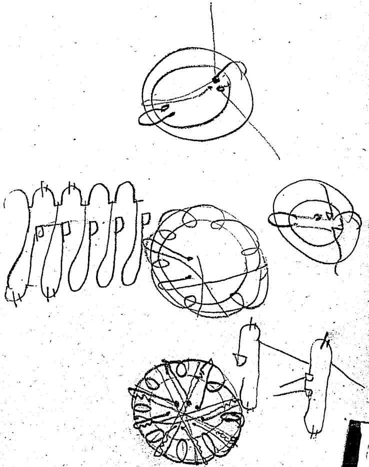

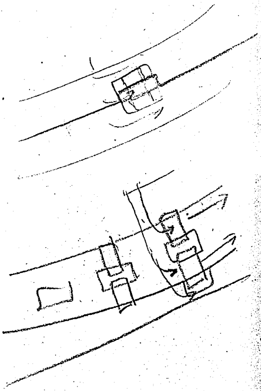

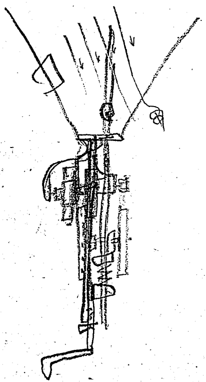

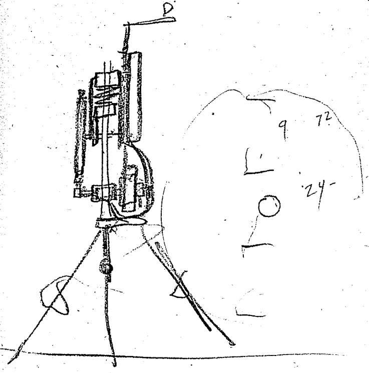
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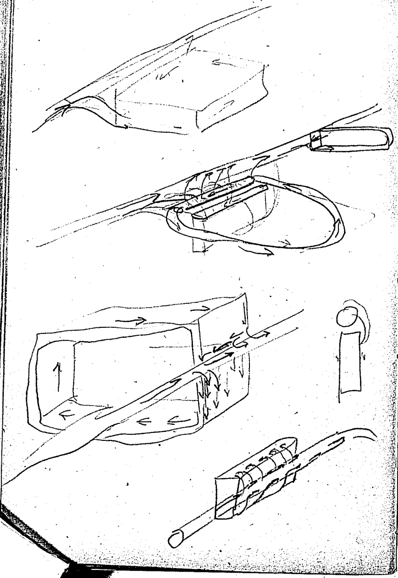

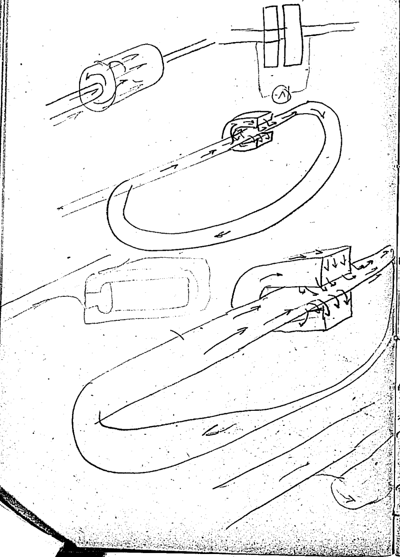

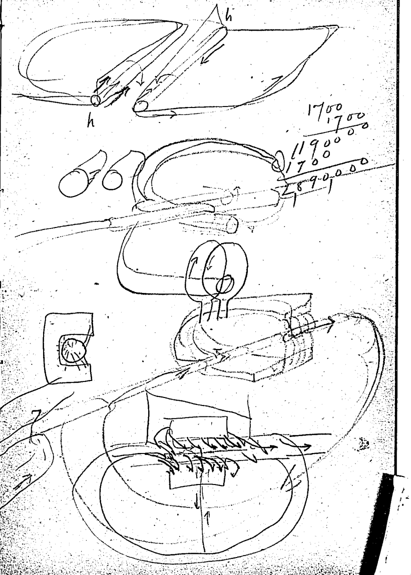

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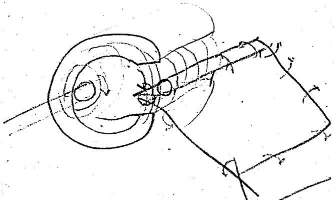

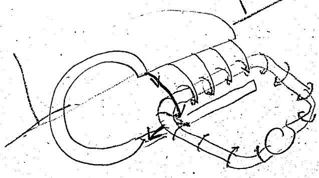

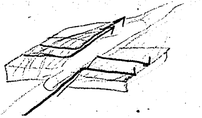

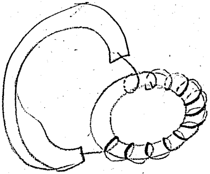

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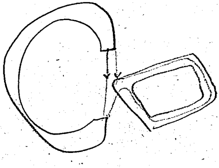

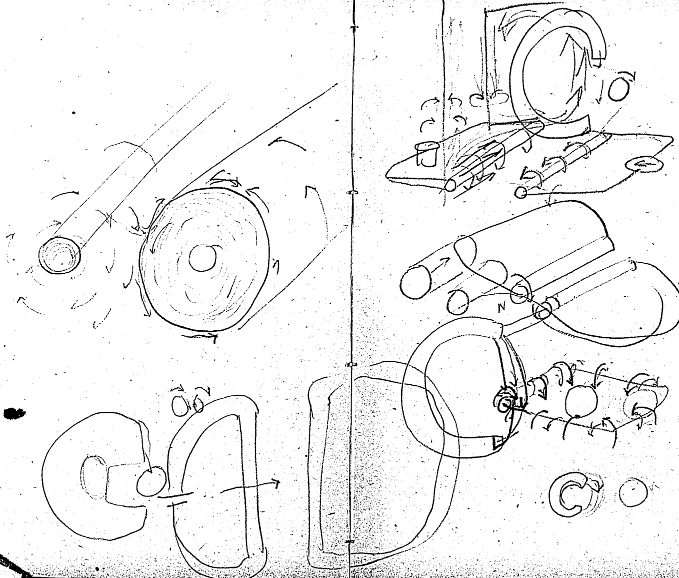
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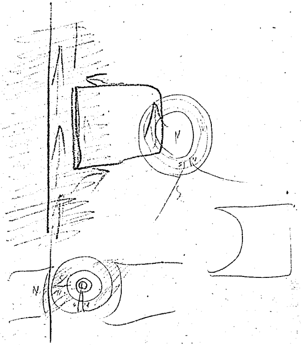
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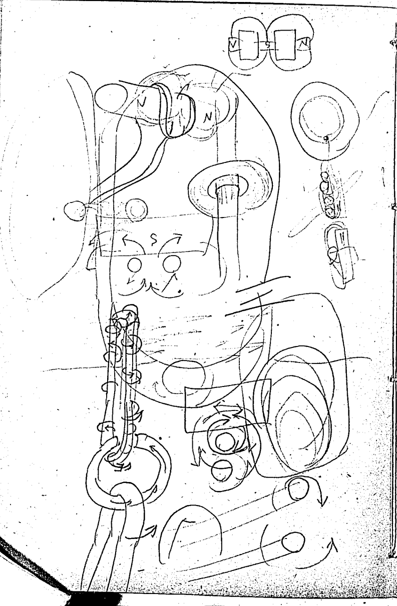
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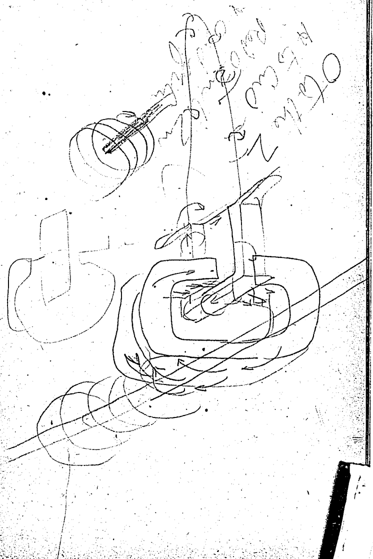
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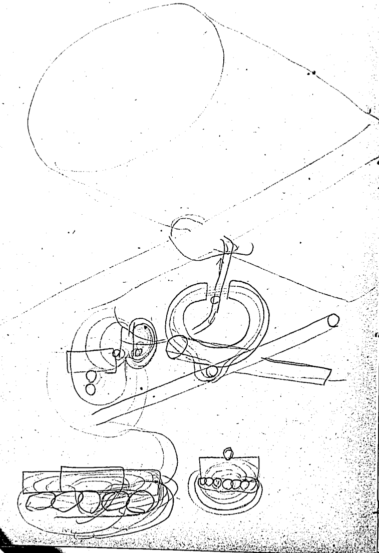

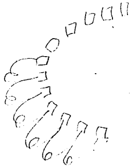

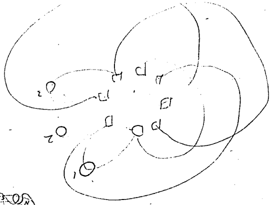
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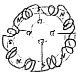
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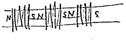
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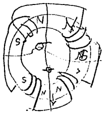
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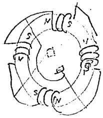
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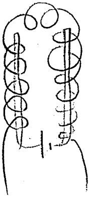

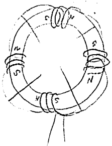
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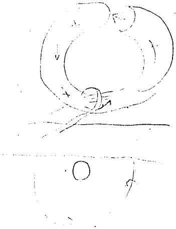
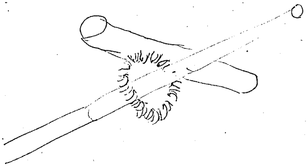
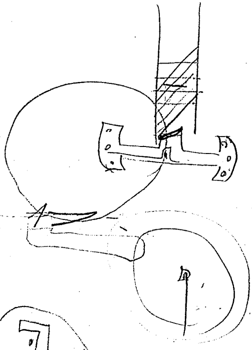
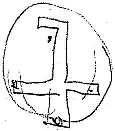
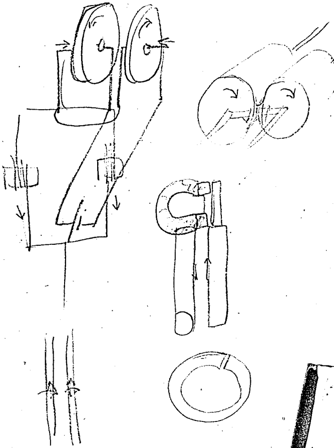
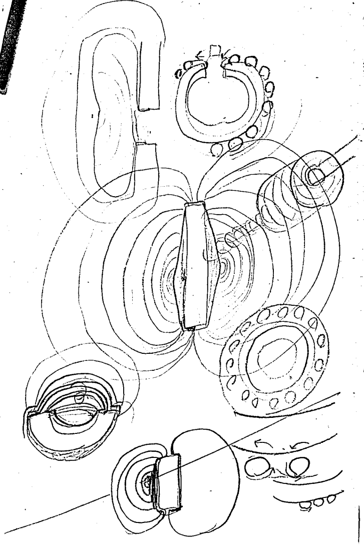




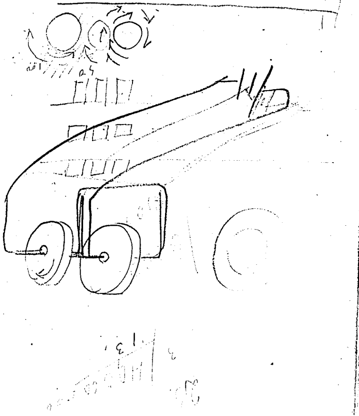








Jim looks like a CRANE



Notebook, N-88-00-00

This undated notebook was used by Edison, probably in 1888 or 1889, for notes on compositions for cylinder records. The pages are unnumbered. Only 12 pages have been used.

XE-172 N-(88-00-00)

No 1 – 282 Stearic
220 Carbonate

all in at once –

100 grms remelted & dosed with 15 grms
Stearic & boiled it for 15 or 20 min
taking tests until test showed
clear button – lots gas given
off as at final boiling took
away flame & it became
practically clear – Not filtered

This is roughening at ord temp
probably better as we go higher
temp –

No 2 — More by a great
amount Oleanic its possible to
get it at one point where its
all white & spongy — the S acid
Cupelling fine — If it could be
[illegible] so it could be
ideal for Ease of Cutting
think it could be done.

No 2 282 Oleanic
240 Carb —

filtered,
100 grams boiled long
time as lots gas came off — finally
it got so thick even with high heat
Couldnt do anything with it,
as gas came off & it was viscous
when cold it was strange [illegible]
feel like [illegible] —
I put in 65 grams Oleanic
just 70 grams made lots
gas & kept ~~[illegible]~~ hot long
time final portion gave no
gas — I think 65 is right possibly
only 45 — [illegible] well —

This works well but a [illegible] looks
lighter so I must have used 45
instead 65 — or I should have
boiled base by itself till ropy
& then add Oleanic which I
did not do —

No 3 is stearic a 100 gram
with about 25 grams of
No 2 base in it Cooled
down nearly to solidifying
& poured - should have had
a Cold mould —

No 4 is 100 Stearic
with 40 grms No 2 base
poured cold in cold mould —

5

Stearic acid 100
8 grms @ Oleate Pb—

Ng

6 – Repro of No 2 but dont
chunk it right –

No 7-E -

362 Stearic
260 Carb 96 - base

~~100~~ 75 grammes base
30 grammes white
Reed wax -

8 ε

362 Stearic
260 Carbo - Base

100 grams Base

58 grams Carnauba -
about - foam burns

[illegible] also

45 Stearic added before
Carnauba —

9—

100 white wax —
20 Carnauba — [illegible]

10-E

100 white wax
30 Carnauba

11 E

100 white wax
40 Carnauba -

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98

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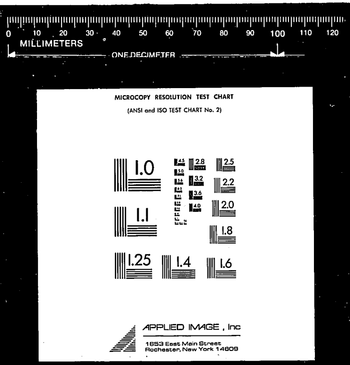

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